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# ***JPRS Report***

## **Soviet Union**

### ***Military Affairs***

DATA, DIAGRAMS OF GROUND FORCES WEAPONRY

148

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SOVIET UNION  
MILITARY AFFAIRS  
DATA, DIAGRAMS OF GROUND FORCES WEAPONRY

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GROUND FORCES

DATA, DIAGRAMS OF GROUND FORCES WEAPONRY

130-mm Gun M-46

Moscow VOYENNYYE ZNANIYA in Russian Nov 11, Nov 86 pp 44, back cover

[Article by Col (Res) V. Knyazkov under the rubric "Talks With Draftees": "The M-46 130mm Gun"]

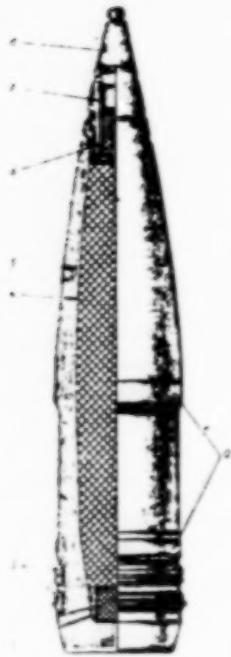
[Text] The artillery piece is best adapted for destroying important targets located long distances from the forward edge.

Look at the back cover. You see the M-46 130mm gun. Even the uninitiated will say that this is a picture of a very powerful artillery system. The barrel alone is 7,600 millimeters long with the muzzle brake.

The readers have a general familiarity with the firing process, of course. Let us picture in our mind what occurs when the firing pin smashes the primer cap. Within thousandths of a second the force of the fire turns the 13-kilogram propellant charge in the closed breech chamber into a gaseous state. With enormous force the propellant gases accelerate the projectile and simultaneously spin it through the rifled bore, causing it to rotate relative to the longitudinal axis and giving it stability in flight. Departing with an initial velocity of 930 meters per second, the 33.4-kilogram shell will destroy a target up to 27,150 meters away. Considering the fact that the gun's rate of fire is 7-8 rounds per minute, there is complete justification for stating that it has excellent fire capabilities.

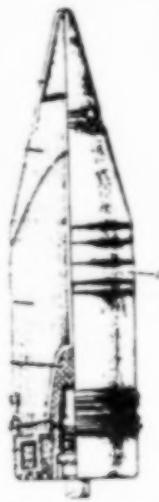
The M-46 is designed primarily for combatting artillery and mortars, for neutralizing personnel and various weapons in assembly areas, for destroying permanent defense earthworks and other strong, field-type fortifications, and for shelling rail junctions and headquarters. It can also enter into single combat with heavy tanks and self-propelled artillery pieces.

The gun's ammunition load includes HE fragmentation shells and armor-piercing shells with tracers. The latter are used for destroying armored vehicles, of course. The most effective fire is by direct laying (incidentally, the range for direct fire at a target up to 2 meters tall is 1,170 meters).



130mm HE Fragmentation Shell

Key: 1. Fusion of paraffin and ceresin; 2. Smoke and flash intensifying charge; 3. Driving bands; 4. TNT explosive charge; 5. Shell body; 6. Exploder; 7. Tapered clamping sleeve; 8. Fuse; a. Positioning band



130mm Armor-Piercing Shell With Tracer

Key: 1. Nut and tracer; 2. Screwed base; 3. Nut; 4. Tracer; 5. Fuse; 6. Driving band; 7. Explosive charge; 8. Shell body; 9. Armor-piercing cap; 10. Ballistic cap; a. Positioning band

The HE fragmentation shells are used most extensively, since they destroy targets both with lethal fragments and with the force of the blast. Note that in the artillery all fragmentation and HE fragmentation shells are called grenades (granata).

When the fuse is set for fragmentation effect (the cap is unscrewed), the shell explodes the instant it strikes an obstacle: a thin metal disc is broken, the firing pin pierces the percussion cap, and an explosion follows.

If the fuse cap is screwed down (HE fuse), the shell does not explode until it has penetrated somewhat into the obstacle. A considerable amount of earth is ejected, and trenches, dug-outs and other shelters are destroyed. The fuse is set for delayed action for firing at very strong, permanent defense installations.

...The order is given at the gun position: "Fire at infantry! Delayed action fuse!" Has the commander made a mistake? No. In a battle the enemy infantry tries to take maximum advantage of terrain features (gullies, opposite slopes of hills, low vertical walls, pits, ditches, and so forth) as natural shelters, and can be destroyed by firing the gun for ricochet.

In this case the shell flies a flat trajectory, ricochets when it strikes the ground near the target and, since the fuse is set for delayed action, explodes at a relatively low height. A large number of fragments are formed, which shower the enemy like deadly rain.

The artillery round for the M-46 is a QF separate loading round. Since it is fairly heavy (59.1 kilograms), it has been deliberately separated into two approximately equal parts. The shell with the fuse is inserted into the bore first, followed by the cartridge with the charge and the igniter.

Its most important technical data are the following. Its elevation arc is minus 2.30 degrees to plus 45 degrees. It has a total traverse of 50 degrees. We can see that the gun has good capabilities with respect to altering its firing direction and range within fairly broad limits from a single spot, without being turned or repositioned.

The M-46 has a fairly high degree of readiness for combat or travel. A trained crew can convert the gun from travel to combat status or vice versa within 3-4 minutes. The organic AT-S medium artillery tractor easily pulls the gun weighing 8,450 kilograms over various kinds of roads and in diverse geographical areas. The artillery unit (tractor plus limber plus gun) can travel at up to 50 kilometers per hour on a highway in any situation. In a combat situation, however, traveling on asphalt is more the exception than the rule. Movements have to be made on country roads, and frequently in roadless areas. The wheels and axles of the tractor and the gun are therefore designed to permit the artillery unit to move in roadless areas at speeds of up to 10-20 kilometers per hour

And now something about the gun's design. I shall name its main parts and indicate their purpose, and their specific structural features when necessary.

The barrel is a monoblock tube with a rifled bore. The gun has a wedge-type breech mechanism which moves horizontally and opens to the right. Its purpose is to lock the bore and fire the shot. A wedge is a figurative comparison, of course. This one does not resemble the tool used for splitting heavy logs. It is actually a massive prism with a slant to the front edge which the eye cannot detect.

When the breech is in the extreme left position it is the same as having a wedge weighing several dozens of kilograms driven into the wedge ring, which reliably closes the bore and receives the powerful shock of the propellant gases.

The cradle, a cast cylindrical yoke, controls barrel movement during recoil and counter-recoil. The idea of a so-called resilient carriage has actually been realized by means of anti-recoil devices consisting of a recoil absorber and a recuperator. They perform a three-in-one function. At the moment of fire, they dampen the enormous force of the shock, preventing it from affecting the carriage, which is held fast in a pit. After the shot is fired the barrel is returned to the initial position. The same devices hold the barrel at any angle of elevation.

The saddle is the foundation of the gun's swinging element; the saddle support, the foundation of its rotating element. The crew adjusts the aim of the gun vertically and horizontally by means of lifting and turning mechanisms with handwheels located to the left of the breech ring.

The purpose of the balancing mechanism is obvious. It balances the gun's tilting unit relative to the cradle trunnion and makes the work of the layer on the lifting mechanism easier.

The sighting devices are a power-driven and a panoramic sight.

Other common parts of the gun are trails, a shield, a wheeled running gear with spring suspension, and a muzzle brake.

The designers also provided jacks to be used by the crew members for raising the trails onto the limber or lowering them. A portable winch mounted on the right trail is engaged when the gun is being prepared for travel, after the crew has disconnected the barrel from the recoil absorber and the recuperator from the cradle. The barrel is moved back to stops located on the trails and secured there. The weight of the gun in travel position is thus distributed evenly on the four wheels. Also important is the fact that the loose end of the barrel is shortened, and this significantly reduces the dynamic stress to which it is inevitably subjected when being moved. All of these operations are performed in reverse when the gun is being converted from travel to combat status. The winch moves the barrel forward, where it is secured, and the gun is ready for firing.

The specialists say that the M-46 can be moved with the barrel not in travel position, but only short distances and at speeds not exceeding 5 kilometers per hour.

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122-mm Howitzer

Moscow VOYENNYYE ZNANIYA in Russian No 5, May 98 pp 42-3, back cover

[Article by Col (Res) V. Knyazkov under the rubric "Talks With Draftees": "The 122mm Howitzer"]

[Text] The 1938 model 122mm howitzer occupies a worthy place in the vast and diverse arsenal of Soviet artillery systems. Its design, acknowledged as classical, has still not lost its importance. This gun was created at the design office directed by prominent artillery engineer F.F. Petrov, Doctor of Technical Sciences, Hero of Socialist Labor, holder of the Lenin and State Prizes of the USSR.

Marshal of Artillery G.F. Odintsov, artillery commander of the Leningrad Front, had the following to say about the 122mm howitzer: "There could not be a better one...." And it is with good reason that the howitzer occupies a place of honor among the exhibits at many museums, including the Military History Museum of the Artillery, Engineer Troops, and Signal Troops in Leningrad. Displayed there is the weapon which put out of action a fascist armored train, four enemy tanks, five armored personnel carriers and two anti-tank guns, and neutralized hundreds of enemy weapon emplacements. Four decades have gone by since the Great Patriotic War ended, but the 1938 model howitzer is still in the armament of the Soviet Army. It is popular with the artillerymen because of the simplicity and reliability of its design and its operation, and its firing accuracy.

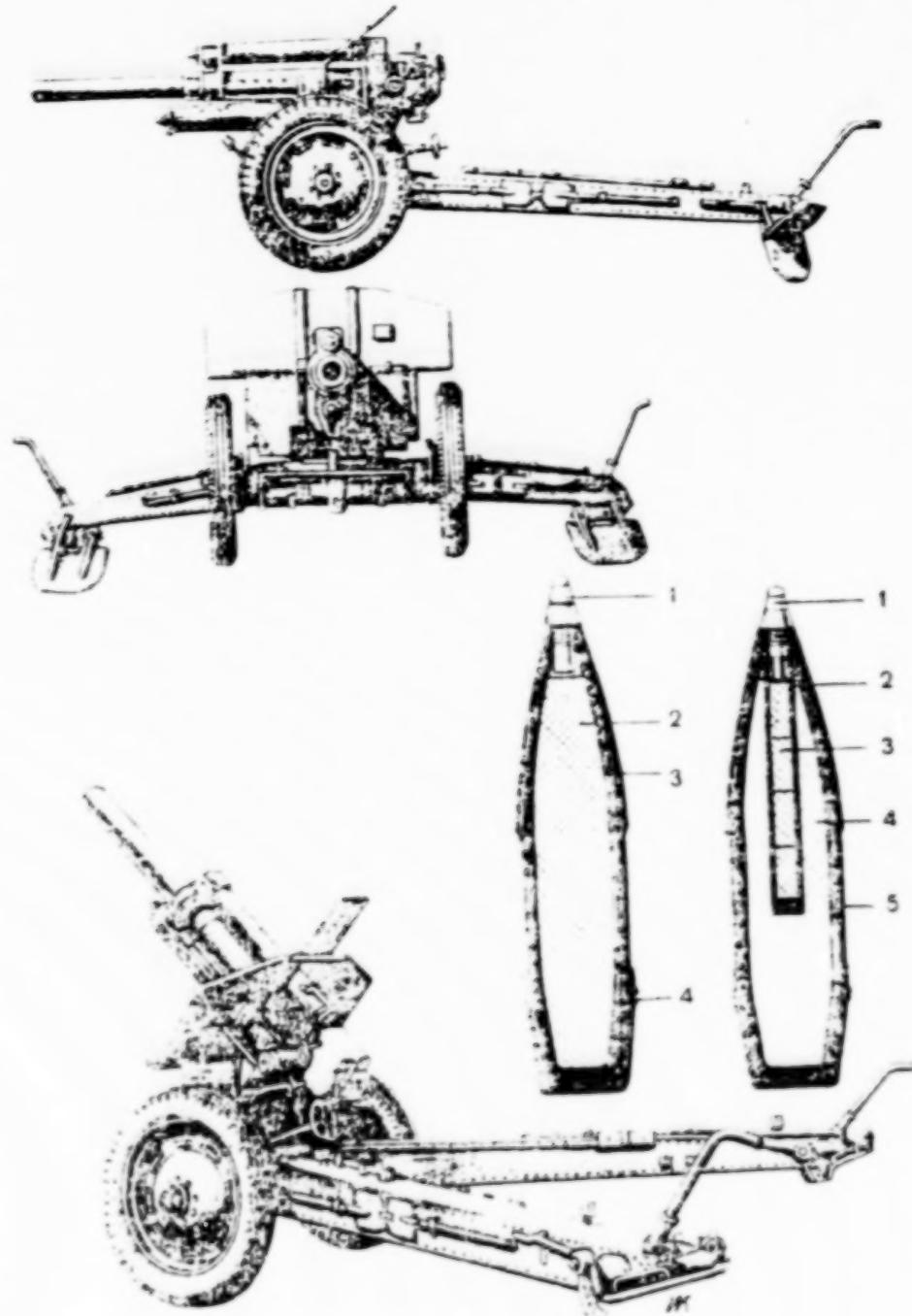
What are the gun's combat capabilities? Its firing range is 11,800 meters. It fires a shell weighing 21.76 kilograms, slightly less than one and a half poods. Specialists define the range of combat missions which the 122mm howitzer can perform on the basis of these features. It is used primarily for destroying or neutralizing enemy infantry personnel and weapons, both exposed and sheltered, for combatting artillery and mortars, and for destroying field-type installations. The weapon can also be used against tanks, self-propelled artillery pieces and other armored vehicles.

The howitzer's ammunition load includes HE fragmentation, fragmentation, hollow-charge, smoke and illuminating shells. A shell, including case, weighs 27.4 kilograms. At the prescribed rate of fire, which is six rounds per minute, the loader must "move" 10 poods of metal every 60 seconds. This is hard work, and the loading is therefore carried out in two parts. The shell is inserted into the loading chamber first, then a cartridge with the propellant charge.

The HE fragmentation shell is called that because it can destroy both with fragments and with the force of the blast, depending upon the fuse setting. The "Fragmentation fuse!" order is given for firing at personnel, gun emplacements, artillery and barbed-wire entanglements. The shell explodes the instant it encounters an obstacle, and the area of damage from the fragments is fairly great: 60 meters wide and 20 meters deep. A crater up to 2 meters wide and 0.4 meters deep is formed in ground of average compactness.

When the fuse is set for HE effect, it is not activated the moment the shell encounters an obstacle, but slightly later, when the shell's powerful inertial force has taken it fairly deep into the obstacle. The explosive charge is detonated at that time. The crater is 3 meters in diameter and 1 meter deep. Trenches and light field installations are destroyed.

"Delayed action fuse!" is ordered for firing at covered trenches, brick or stone structures. In this case the shell penetrates even further into the obstacle, thereby increasing its destructive effect.



122mm Howitzer

HE Fragmentation shell

Key:

1. Fuse
2. Explosive
3. Shell casing
4. Driving band

Smoke shell

Key:

1. Fuse
2. Burster tube
3. Explosive charge
4. Smoke generator
5. Shell casing

The fragmentation round, which produces a considerable number of lethal fragments, is used exclusively for destroying personnel in the open and infantry gun positions. The purpose of the hollow-charge shell is obvious: to destroy tanks, armored personnel carriers, infantry combat vehicles and self-propelled artillery pieces.

The smoke round is used for blinding the enemy and laying a smoke-screen. It is also used for target indication, signaling, ranging, and determining the wind velocity and direction in the area of the target. Illuminating rounds are used at night for observing the area occupied by the enemy and for monitoring the effect of our own artillery fire.

The specialists break the howitzer down into two main parts: the barrel and breech mechanism, and the carriage. The barrel is a monoblock tube with a casing and a breech ring. A screw-type breech mechanism is used. The carriage includes the cradle, anti-recoil devices, the saddle, lifting, turning and leveling mechanisms, the carriage body with two adjustable trails, a running gear with spring suspension, sighting devices, and a shield.

I think that the functions of the gun's parts and mechanisms are basically clear. Let us briefly explain just those original technical elements necessitated by the specific features of this artillery system. Incidentally, the howitzer weighs 2,450 kilograms in combat status and 2,500 kilograms in travel status. The wheeled running gear therefore has reliable spring suspension, and it has rubber tires filled with foam rubber.

One of its good technical aspects is a ski mounting used for towing the weapon with a tractor through deep snow or swampy terrain. These are not like racing or even hunting skis, of course: only the design has been borrowed. The mounting consists of two metal skis with articulated front ends and two chains with fasteners. Each wheel is on its own ski. If necessary the artillery unit (tractor plus gun) can travel in areas with practically no kind of roads. One remarkable thing is that the howitzer can be fired right from the ski mounting. It is necessary only to lower the tips of the skis before spreading the trails. There is one slight limitation, to be sure. For all-round field of fire the angle of elevation must not exceed 30 degrees, and the barrel can be turned only plus or minus 15 degrees horizontally when firing at any angle of elevation.

I should also mention the hollow metal roller connected by a drawbar to the carriage trail. It makes it considerably easier to move the howitzer by hand, particularly over medium-rugged terrain, since the gun's weight is more or less evenly distributed among three supports, the pair of wheels and the roller.

The 1938 model 122mm howitzer can fire over the entire range scale, even at maximum range, at angles of elevation of minus 3 to plus 63 degrees and 30 minutes, and at horizontal firing angles of plus or minus 24 degrees and 30 minutes. Within those limits the howitzer can straddle any target without changing positions. The barrel is merely turned to the right direction and set at the right angle of elevation. Adjusting fire is thus literally only a matter of minutes.

Wheeled maneuvering--the howitzer's ability to switch fire positions very rapidly-- involves three stages: converting the weapon from combat to travel position, moving, and converting the weapon from travel to combat status.

In the first stage the crew lowers the howitzer barrel to horizontal, moves the trails together and locks them, connects the spring suspension, removes the optical sighting devices and places them into their containers, and places the cover over the weapon. The standard amount of time allocated for all of the main and certain additional operations does not exceed one and a half minutes.

When the tractor "hooks up to" the howitzer, the march begins. The unit travels at 35 kilometers per hour over country roads and cobblestones. The artillery unit can reach a maximum speed of 50 kilometers per hour on a highway.

The artillery crews must be prepared for anything during the switching of fire positions. If the sharp, shot-like order "Tanks on the right! Prepare for combat!" is suddenly given, every instant, every second, is dear. The artillerymen must demonstrate maximum skill and efficiency, and prepare the gun for firing by direct laying as rapidly as possible. A tank is so dangerous, after all, that they must begin firing at it immediately and as rapidly as possible.

The normal time allocated for converting the howitzer from travel to combat status is 1-1.5 minutes. The designers have done their part. After studying the strength of the weapon, they have made an important recommendation to the artillerymen: if subjected to a surprise attack on a march or if it is impossible because of the terrain to completely ready the weapon for combat, it may be fired without separating the trails. There is only one restriction--that the total traverse may not exceed 1 degree and 30 minutes.

When the howitzer takes up its new fire position, it is converted from travel to combat status in the usual way, so to speak: the trails are separated, the spring suspension is disengaged, the summer spades are turned down and inserted all the way into the ground. This gives the weapon stability, which is of considerable importance with respect to firing accuracy and grouping, particularly when firing long-range.

In general, the 1938 model 122mm howitzer is an exceptionally dependable and highly efficient artillery system in which many combat features have been successfully combined. This means that it can be successfully employed in all types of combined-arms combat.

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#### 152mm Self-Propelled Howitzer

Moscow VOYENNYYE ZNANIYA in Russian No 11, Nov 83 pp 45, back cover

[Article by Col Engr V. Knyazkov under the rubric "Talks With Draftees": "The 152mm Self-Propelled Howitzer"]

[Text] The howitzer is a standard artillery weapon. While a "conventional" howitzer needs a tractor for moving (it is towed "on a hook" behind the tractor), however, the self-propelled howitzer hauls itself, so to speak.

First, a few words about the combat missions it performs. A howitzer is designed for destroying or suppressing nuclear weapons, artillery, mortars and

other weapons, as well as enemy personnel. In addition, it is capable of combatting tanks and self-propelled guns, and inflicting perceptible strikes against enemy rear services, command and control elements.

That is not all, though. Remember that a howitzer mainly conducts so-called high-angle fire. The shell's trajectory is fairly steep. It literally leaps over the target and actually strikes from above, which is the best way to destroy field and permanent defense installations.

The mission is more crucial than the previous, as you can see. And they can only be carried out with a weapon of this large caliber, 152mm. Installed in the part of a rotating turret, it can destroy an enemy at ranges of up to 17,300 meters. The shell weighs slightly less than a half-quintal (43.56 kilograms to be exact). The howitzer barrel can be moved vertically in the turret from an angle of depression of plus 4 degrees to a maximum angle of elevation of plus 60 degrees. The turret itself rotates horizontally in a full circle.

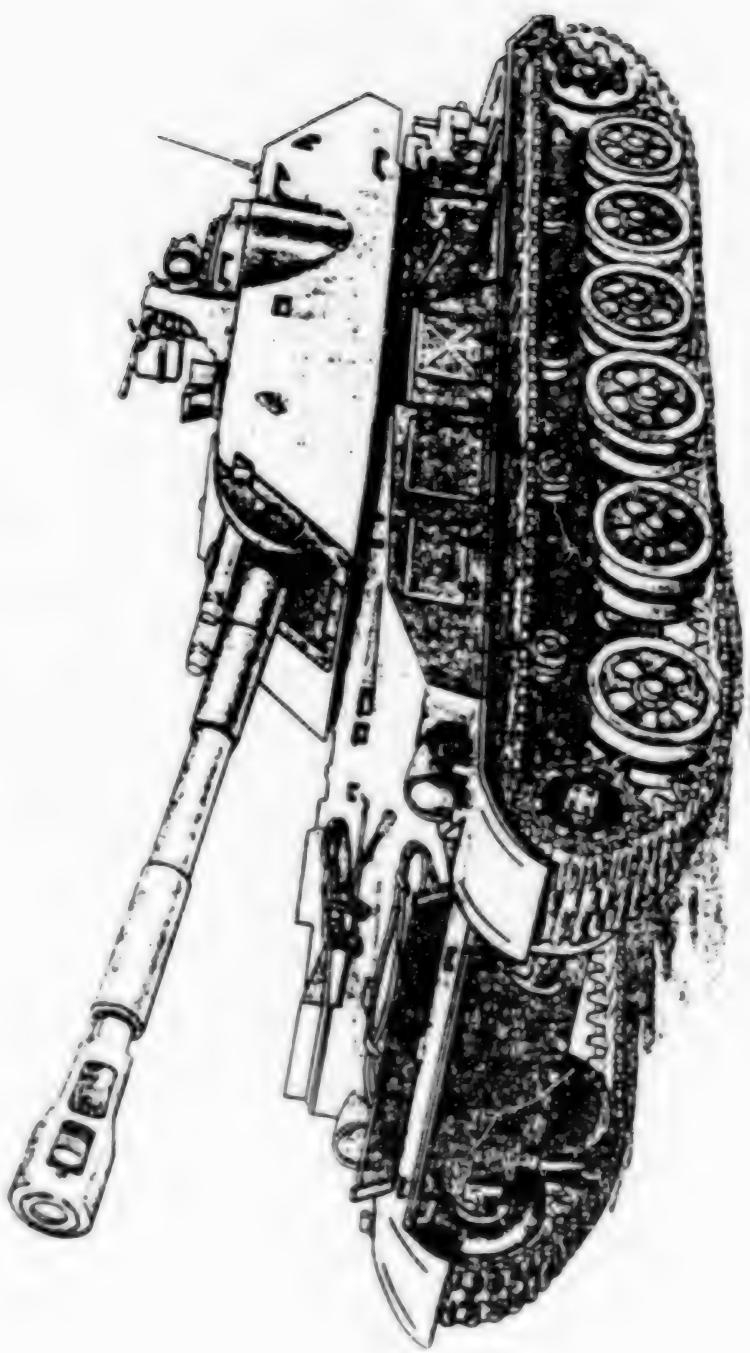
The latter is very important. Let us imagine that the crew of the self-propelled howitzer suddenly hears the order "Tanks to the rear!" Just what will it do? The gunner engages the electric drive, and the turret turns 180 degrees in 18 seconds.

Naturally, the crew fires at the tanks from an open position by direct laying. This is the most effective and accurate kind of fire. A distinguishing feature of the 152mm self-propelled howitzer is its ability to destroy armored vehicles at considerable distances, since the maximum firing range with the direct laying sight is 5 kilometers (!).

The crew of the self-propelled howitzer needs a minimum of time to take up a fire position. Essentially, the fire position is wherever it stops. There is no need to dig a pit, since the crew and all of the equipment are reliably protected by armor. The command "Prepare for combat!" is given, and the artillerymen perform efficiently, skillfully and swiftly. Literally in a matter of minutes the combat vehicle is ready to rain rounds upon the target.

But now a word about the howitzer's rate of fire. It has 9! separate loading. A fixed artillery road for a weapon of this caliber would weigh a great deal, after all. Remember that an HE fragmentation shell weighs 43.56 kilograms, and a complete cartridge charge with cartridge an additional 16 kilograms. The process of loading the howitzer is mechanized. It is performed by means of a stew-gunner. Only one operation is performed by hand. The loader transfers the cartridge cases and projectiles from the ammunition tray to the howitzer's loading tray. All of the design features give the 152mm self-propelled howitzer a potential rate of fire of three rounds per minute.

Is this a lot or a little? It is a fairly high rate for a weapon of such large caliber. An aimed round is fired at the enemy every 20 seconds. When a battery of four self-propelled howitzers conduct rapid fire at a "pinpoint" target (a permanent enemy installation) for 1 minute, it will be struck by 12 howitzer rounds, or more than a half-ton of the deadly metal!



152mm Self-Propelled Howitzer

Look at the drawing. A PKT (Kalashnikov tank machine-gun) is installed in a turret at the top. It is a 7.62mm gun with a maximum aimed firing range of 1,500 meters. It is belt-fed, and each belt holds 250 rounds. It has a rate of fire of up to 250 rounds per minute.

And now a few words about the general design of the 152mm self-propelled howitzer.

It has three sections: a driving compartment, an engine compartment and a fighting compartment. The first is located in the hull nose between the left side and the engine compartment partition. This is where the mechanic/driver works. The engine compartment is to his left. It contains the engine and all of the operating mechanisms and systems.

The fighting compartment occupies the midsection and stern in the hull and the entire turret. The gunner's seat is mounted on the left side of the howitzer, that of the loader is on the right. The commander of the self-propelled howitzer is located behind the gunner. A commander's turret with a hatch is directly above his seat. The commander has at hand a radio, an intercom device, a panel and a plotting board for making notations.

The howitzer itself consists of a barrel, a semi-automatic breech mechanism, a cradle and a deflector, anti-recoil devices, lifting and leveling mechanisms, a rammer and electrical equipment. A vertically operated wedge-type breech mechanism is used. With respect to the deflector, it prevents the crew from being struck by recoiling parts when the weapon is fired.

The electric laying drives can operate without breaking down within a broad range of temperatures (from minus 40 to plus 45 degrees) and with a relative humidity of up to 98 percent. They retain their operating efficiency also in mountains (up to an elevation of 3,000 meters above sea level) and withstand shaking, vibrations and dust.

I could not fail to mention also the observation and aiming devices. By means of these devices the artillerymen inside the combat vehicle reconnoiter the terrain, detect and destroy targets with artillery and machine-gun fire. Surveillance can be carried out and firing can be performed from the self-propelled howitzer at any time of day.

The self-propelled howitzer weighs 27 tons. Despite this, it has good maneuverability and fairly good cross-country ability, and it is extreme mobile and maneuverable. The self-propelled howitzer is capable of moving at speeds of 25-30 kilometers on dirt roads, up to 40-45 kilometers on highways. Maximum speed on a highway can reach 62 kilometers per hour. With respect to range, the combat vehicle can travel 500 kilometers on a single fueling. This is extremely important. The maneuverability of the tracked combat vehicle can be judged from the fact that it is capable of turning practically "on a dime." The mechanic/driver brakes one track completely, while the second continues to move and turns the self-propelled howitzer. The minimum turning radius equals the track gauge (which for tracked vehicles is the distance between the track centers), or 2,720 millimeters.

Such technical features as the self-propelled howitzer's powerful engine, the specific pressure of its tracks on the ground, and its road clearance are especially important with respect to one other component of maneuverability, cross-country ability.

Let us begin by saying that the length of its bearing area is 4,622 millimeters, and at a weight of 27 tons the combat vehicle exerts extremely little pressure on the ground--on the order of 0.6 kilograms per square centimeter on average, which corresponds to the pressure exerted on the ground by an adult person. Furthermore, the vehicle has an extremely large road clearance of 450 millimeters. This affects the vehicle's ability to travel in roadless areas, of course, including swampy areas, through snowdrifts and stumps, on dirt roads with deep ruts, and so forth.

The 520hp engine easily moves the self-propelled howitzer. It can climb an incline of up to 30 degrees. When moving across a slope it does not list more than 25 degrees. It is not stopped by a ditch or even a trench up to 3 meters wide. It can climb a vertical wall up to 0.7 meter tall. The combat vehicle cannot float, but it can ford a water barrier no deeper than 1 meter.

We can see that the 152mm self-propelled howitzer has good fire and operating capabilities. The combination of powerful armament and the self-propelled chassis make it an effective weapon.

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#### Dismounted Platoon on Attack

Moscow VOYENNYYE ZNANIYA in Russian No 6, Jun 81 pp

[Text] A dismounted attack may be conducted during an offensive from the march or from a position of close contact with the enemy.

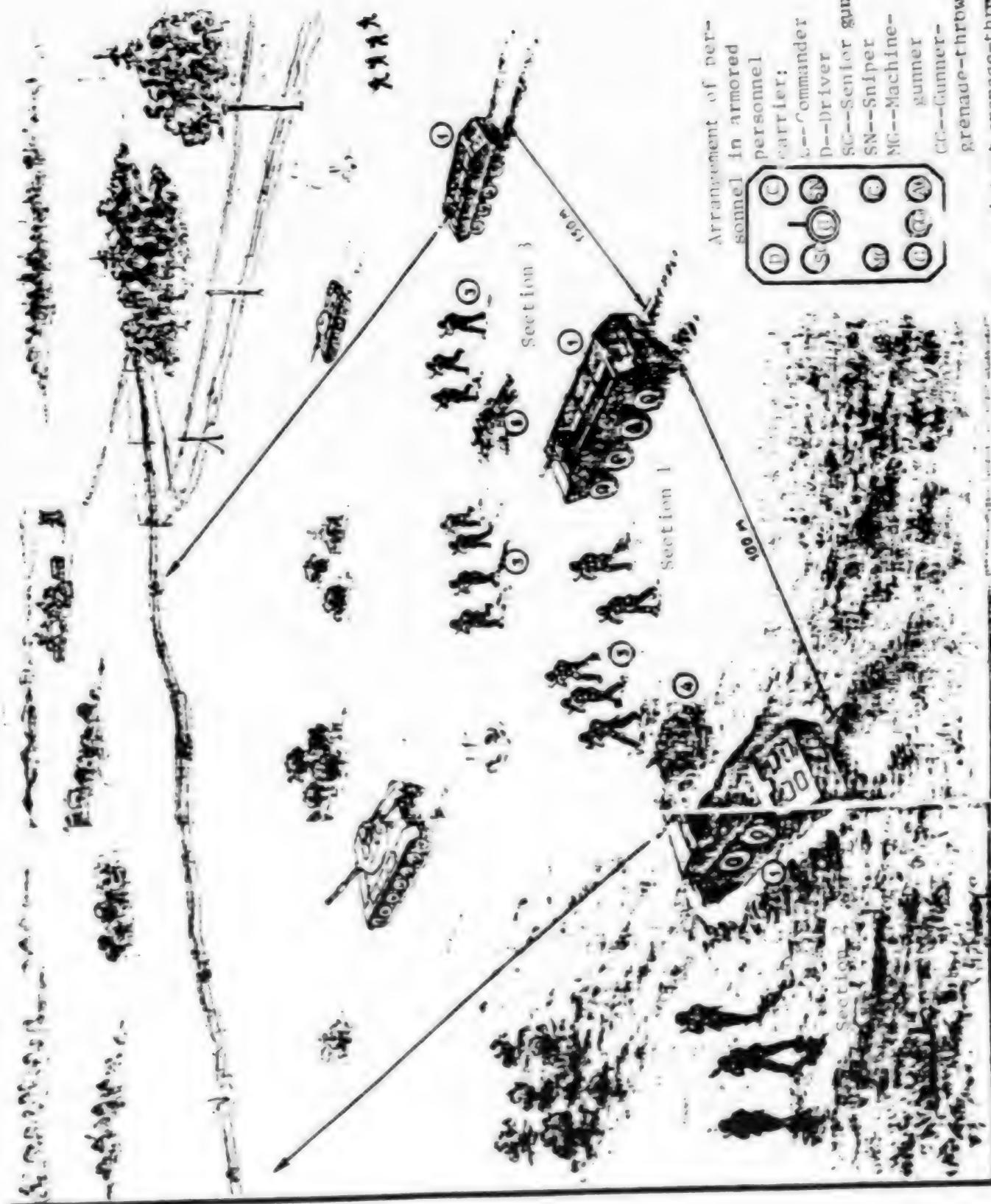
In the case of an attack from the march, when the platoon approaches the dismounting line, the commander gives the order "Platoon, prepare to dismount!" and the section commanders repeat the order. The armored personnel carriers (1) then catch up with the tanks (2), the motorized riflemen put their weapons on safety and remove them from the firing slits.

The platoon commander gives the order "Platoon, to vehicle!" and the mechanics/drivers (drivers) slow the combat vehicles. The fightingmen leap out and, in an extended line (3) approach the edge of the enemy's defense, in double time and firing as they go.

Taking advantage of cover, the grenade launchers (4) and machine-gunners (5) may fire during brief halts.

In an attack from a position of direct contact with the enemy, the unit commander gives the order "Prepare to attack!" when the tanks reach the start line. When they have passed it, he gives the order "Platoon, forward! Attack!" The motorized riflemen leap from the trenches (or ditches) and attack the enemy together with the tanks.

The motorized rifle section has a BTR-60P, a four-axle, all-wheel-drive, armored amphibious combat vehicle. The armored personnel carrier has good cross-country ability and is capable of engaging in direct pursuit of tanks and of crossing trenches, ditches and water barriers from the march.



Two 90hp, 6-cylinder carburetted engines are mounted in the nose of the armored hull.

The wheels have pneumatic tires, size 13.00-18. The tire pressure is regulated by a centralized system. The armored personnel carrier is equipped with hydro-jet propulsion and has day and night vision devices.

The armored hull has three sections: an engine compartment, a fighting compartment and a driving compartment. On each side are three oval hatches with locking armored lids. The hatches are for observation and for firing personal weapons.

#### The BTR-60P

combat weight--9,800 kgs; seating capacity--16; hull length--7,220 mm; hull width--2,906 mm; hull height--2,105 mm

Speed: maximum highway--80 km/h; maximum on water--9-10 km/h;

Obstacle crossing: incline--30°; list--25°; ditch--up to 2 meters

SGMB [Goryunov Improved Heavy Machine-Gun]--7.62 mm

sighted range--2,300 m; cyclic rate of fire--600-700 rounds/minute; weight--14 kg; rounds in a belt--250; basic ammunition load--1,250 rounds

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#### Training on 122-mm Howitzer

Moscow VOYENNYA ZNANIYA in Russian No 1, Jan 81 pp 40-41

[Article by Col Engr V. Knyazkov under the rubric "Talks With Draftees": "Battery, Fire!"]

[Text] ...Dawn found the artillerymen in hills and thickets. The road zigzagged. Steep descents came after long inclines. The artillery tractors, now revving up the engines, climbed stubbornly upward; now raising clouds of dust, rolled downward.

This rapid march, almost a rush, carried out because of the urgent need to switch fire positions, was not an easy one. The fightingmen had to exert themselves to the fullest at the signals "AIR!" and "GAS!" and to cross an area "contaminated" with radioactive substances in protective gear. They did not arrive at the site indicated by the senior chief for several hours.

The mission was assigned. Captain Vasiliy Kazantsev, battery commander, indicated the sites for the commander's observation post and the gun position. Questions? No questions. And the work went into full swing....

Lieutenant Nikolay Ostapenko's precise orders could be heard at the gun position:

"Unhook"!

"Action"!

"TRACTORS INTO SHELTER"!

The artillery crews positioned the howitzers, removed the covers, checked the mechanisms and prepared the ammunition.

They were hard at work also at the commander's observation post. Artillery forward observers, radio and telephone operators... were busy at their work. The initial data were being prepared for firing at an important target. Time was counted in seconds.

Some time later the battery commander made a readiness check. It was time. Now the orders went out to the gun position:

"INFANTRY CONCENTRATION"!

"FRAGMENTATION FUSE"!

"RANGE..."!

"BATTERY, FIRE"!

The artillery barrels turned smoothly and froze in place. A red signal flag fluttered from Lieutenant Ostapenko's raised hand. He dropped it abruptly. Instantly, tongues of flame flashed forth, and pressured air struck the ears. Shells swept toward the target.

This is a small episode from the combat training of fightingmen in the 122mm howitzer battery. One can judge from this example alone, however, that the ground-to-ground artillery is capable of successfully carrying out various fire missions for motorized rifle, tank and airborne subunits and units.

Artillery is the god of war. This common but meaningful expression, born during the Great Patriotic War, very precisely reflects the exceptionally important role which the artillery played in the defeat of the German fascist forces. And the artillery was employed on a truly gigantic scale.

Suffice it to say that in the Berlin Operation alone, for example, the Soviet command concentrated almost 42,000 guns and mortars against the Hitlerite forces. The density of Soviet artillery reached 250-300 or more barrels per kilometer of front in a number of engagements and operations. The enemy suffered enormous losses of personnel and equipment at a crucial time. This assured a successful offensive by our forces.

One might ask the valid question: Has the artillery lost its importance today? Not at all. Despite the development of nuclear missiles, artillery continues to be highly important in modern combat.

Howitzers and guns, for example, can damage or destroy enemy nuclear weapons, personnel, tanks, artillery guns and mortars, electronic and other combat equipment. They are used for destroying field and temporary defense installations. These models of artillery weapons are capable of disrupting troop command and control, and preventing the enemy from maneuvering, performing defense work and restoring damaged facilities.

This shows how many important missions the artillery performs. It took an entire paragraph just to list them. And all of this is due to the good combat features of the artillery systems.

Just what is an artillery piece? The specialists give this definition, for example: "The modern artillery piece is a complex combat vehicle capable of hurling a shell with enormous destructive force into the enemy's disposition and unexpectedly destroying a designated target many kilometers away from the weapon."

What are the targets of artillery in a battle? Targets may be most diverse with respect both to their features and to their disposition: horizontal or vertical, exposed or covered, mobile or stationary. They differ in strength and are located various distances from the weapon.

Ideally, of course, all of these targets could be destroyed with a single type of weapon. Unfortunately, however, there is no such universal weapon, and it is doubtful that there will be one.

Let us look at two small examples as confirmation of this.

A tank is attacking a position. What is the best type of shell for destroying it? One which is heavy, travels at great speed and with a shallow trajectory, and strikes the armor at a right angle. The latter is certainly not unimportant. If the shell strikes the armor at a sharp angle, it can slide off the surface of the armor in a so-called ricochet. A gun is therefore best for firing at a tank. And the shot in this case, which will have an angle of elevation of less than 20 degrees, is called flat-trajectory firing.

Let us imagine a different target--enemy personnel in a covered trench. The covering has to be penetrated in order to destroy the trench, and only from above. The greatest effect is achieved in this case. The shell does not travel a shallow trajectory, but, on the contrary, a very steep one. A howitzer or mortar is best for performing this mission.

Firing at angles of elevation of 20-45 degrees is called high-trajectory (naves-naya) fire, while firing at angles greater than 45 degrees is called upper-registry (mortirnaya) fire.

And now let us learn about the combat features of the 122mm howitzer, which was mentioned at the beginning of the article. They include, among other things: firing range, rate of fire, capacity for extensive maneuvering, gun power, firing accuracy, and the element of surprise for destroying a target. All of these are determined by absolutely specific technical features of this weapon.

Take firing range, for example. This is defined as the greatest horizontal distance which a specific weapon can fire. It is 15,300 meters for the 122mm howitzer.

I stress the fact that firing range is one of the most important combat features of a weapon. Let me explain that. A howitzer battery is firing at a target, let us say, when the commander is assigned a new mission: a more important target has been detected--a concentration of enemy personnel and weapons, for example. What should he do? Leave the fire position and move to another? Time

will not permit that. The firing range comes to the rescue. The commander orders the barrels to be turned, and in a matter of minutes the battery opens fire on the new target. This is what is called adjustment of fire. It is done without switching positions and makes it possible to hit the enemy unexpectedly.

Now a brief word about rate of fire. This combat feature is defined by the largest number of rounds a weapon can fire in 1 minute without re-laying. The howitzer has a fairly high rate of fire--6-8 rounds per minute. This means that the crew fires an aimed shot from the howitzer every 8-10 seconds.

Imagine that the battery commander has been assigned the mission of switching fire positions and providing fire support for a motorized rifle subunit on another sector. How rapidly can this be done? Everything depends upon the maneuverability of each howitzer and of the battery as a whole--more precisely, upon all those elements which define maneuverability.

Take travel speed as an example. The howitzer can be moved over a good road at a speed of up to 60 kilometers per hour. This is a high speed, comparable to that of an express train. The tractor with the "hooked-on" howitzer can travel on dirt and country roads, and sometimes in roadless areas.

But how much time will it take to leave the fire position? How much time will it take the crew to convert from travel to combat status? All of this is also an inseparable part of the concept "maneuverability." I shall illustrate this with some figures. The howitzer can depart a fire position and be ready to travel literally in a matter of minutes. And it can be converted from travel to combat status in 1.5-2.5 minutes.

And now a few words about the power of the 122mm howitzer. The force which ejects the shell from the bore is created by the pressure of propellant gases. The howitzer develops truly fantastic power in this process. I shall explain this with a small mathematical calculation.

Around 1,500 liters of gases are formed during the combustion of 1 liter of gun (artilleriyskiy) powder. Let me say at the outset that this volume of gas would be formed at a temperature of 0 degrees. A temperature develops in the bore, however, which cannot be compared with the temperature of a gas-jet flame (900 degrees), for example, or that of molten steel (1,400 degrees). In this situation the gasses formed during the combustion of 1 liter of powder would occupy an area of approximately 15,000 liters (!).

Consider the fact that the powder charge burns up within several thousandths of a second, and you can understand the great power developed by the 122mm howitzer--on the order of 300,000 hp.

It is therefore not surprising that this combat vehicle, which weighs only 3,200 kilograms, hurls a heavy howitzer shell (weighing on the order of 22 kilograms) a distance of 15 kilometers.

How many rounds are needed to hit the target? This is far from an idle question. After all, all of the howitzer's remarkable combat features discussed above would

be useless if the shells flew past the target. All else being equal, firing accuracy is actually of paramount importance. There is a perceptible difference, of course, between a weapon which uses 200 rounds to destroy a target and another which uses only 20. The howitzer we are discussing is highly respected among the artillerymen for its firing accuracy. Attempting to describe the howitzer's good firing accuracy, they sometimes jokingly say that one could hit a cap if one wanted to. This underscores once again the howitzer's ability to conduct effective fire also against so-called "pinpoint" targets.

It is perfectly obvious that various types of shells are needed for performing various combat missions: destroying personnel, destroying shelters and fortifications, combatting tanks and armored vehicles, and so forth. The ammunition for the 122mm howitzer meets these requirements. The weapon's ammunition load includes both HE fragmentation and armor-piercing shells.

Let us define our terminology. All HE fragmentation shells are called grenades (granata) in the artillery. An HE fragmentation shell for the 122mm howitzer has a thin-walled body and a shell filling of considerable weight. To a certain degree this is a universal shell, and all because it is equipped with a special fuse.

The shell's effect upon the target depends upon the fuse setting. One of the crew members takes care of this just before the loading. "Fuse setting" is perhaps too high-sounding a term, of course. The striker pin on the fuse is covered by a thin metal disc, and the latter is covered by a safety cap. If the purpose of firing is to destroy shelters, then the HE effect is needed. The cap is not removed in this case, and the fuse is activated a certain amount of time after it encounters the obstacle. The shell digs into the ground, for example, and the blast forms a crater 3 meters in diameter and around 70 centimeters deep.

Enemy personnel need to be destroyed with fragments, of course. and the more fragments are formed when the shell explodes, the greater the destructive effect. There can be only one conclusion then: the fragmentation effect must be obtained from the shell. This is done by setting the fuse for instantaneous effect--that is, by removing the cap. The shell then explodes at the slightest contact with an obstacle. The destructive effect then covers an area of 300 square meters when firing at prone personnel, 800 square meters when firing at attacking personnel.

The purpose of armor-piercing shells is quite specific. They are for firing at armored targets.

The term "fire position" has been used several times. I shall explain it. The meaning of "fire" (ognevaya) comes from the word "fire" (ogon), of course. And it refers to artillery fire--that is, the firing of the guns. To artillerymen the term "fire position" therefore means an area occupied or prepared for occupation by guns for firing. Furthermore, there are concealed and exposed fire positions, depending upon the situation.

The uninitiated individual might think that a concealed position means that it is actually covered by some sort of protective cover. Of course not. This is

a position at which the guns located there cannot be seen by the enemy from the ground. Give-away signs--the flash from the shot and the powder smoke--are also concealed.

In this case the battery commander is at the commander's observation post, several kilometers from the position. He is observing the target and adjusting fire for the guns.

Then just what is an exposed fire position? The guns set up there are not concealed from ground observation by the enemy. Everything is clearly visible. The guns fire at the enemy point-blank, as they say, by direct laying.

This is particularly typical for anti-tank guns, which are specially designed for combatting armored targets. But we shall tell about the use of these guns in a separate article.

To wrap up our discussion of the 122mm howitzer, I would note that the gun is extremely reliable and effective in combat and that it has good durability (the barrel can withstand several thousand shots).

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#### Attacking Platoon Without Dismounted Support

Moscow VOYENNYYE ZNANIYA in Russian No 12, Dec 80 pp

[Text] The attack on the enemy's forward edge without the personnel dismounting from the infantry combat vehicle (or armored personnel carrier) has recently been employed more and more frequently.

This essentially involves the following: infantry combat vehicles (1) break through the enemy's defense with fire and armor, skillfully combining fire and movement, interacting with tanks (2), with support from missilemen and artillery (3), fire support helicopters (4) and planes (5), and proceeding directly behind their exploding rounds, and advance into the depth.

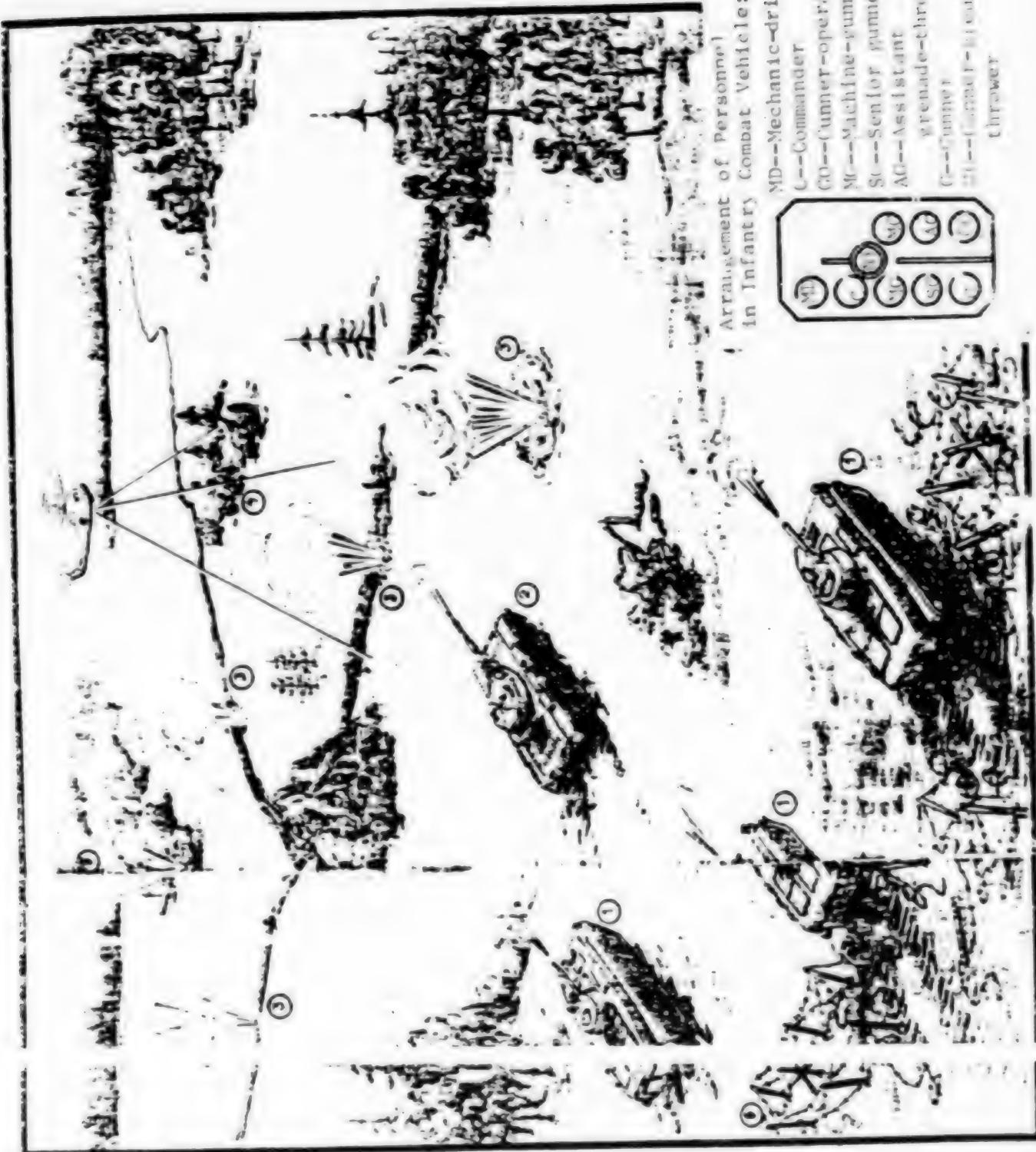
The motorized rifle and tank subunits cross the enemy's mixed minefields (6) in combat formation, without closing up [ranks].

The advantage of attacking without dismounting is that a rapid pace of advance is achieved, the results of the fire from our artillery and other weapons are exploited to the maximum degree, and it becomes possible to effect rapid and deep maneuvering, particularly in the enemy's defensive depth. The personnel are protected against small-arms fire.

The T-62 Tank: combat weight--36 tons; crew of four

Average speeds: 22-27 kilometers per hour on dirt roads; 32-35 kilometers on highways

Overcoming obstacles: angle of climb-- $32^\circ$ ; list-- $30^\circ$ ; ditch width--2.8 m; wall height--0.8 m; fording depth--1.4 m



Armament: 115mm smooth-bore gun

Infantry combat vehicle: weight in combat status--13 tons; crew of three; assault group of eight

Average speeds: 40-45 kilometers per hour on dirt roads; 50-55 kilometers per hour on highways; 7 kilometers afloat

Overcoming obstacles: angle of climb--35 degrees; ditch width, 2.5 meters; wall height, 0.7 meter

Armament: 73mm gun; 7.62mm PKT twin-barreled machine gun; wire-guidance PTURS [anti-tank guided missile] system; RPG-7 manual anti-tank grenade thrower; two PK machine guns; seven AKM submachine guns; ten F-1 grenades; one signal pistol

The motorized rifle section has an infantry combat vehicle, the BMP-1, which is a high-speed, amphibious armored vehicle with powerful armament.

The spacious assault troop compartment, firing ports and viewing devices make it possible for the assault troops to conduct massive fire while the vehicle moves to the battlefield.

The armored hull is separated into four compartments; a driving compartment, an engine compartment, a fighting compartment and an assault-troop compartment (for an eight-member assault team).

The seats for the mechanic/driver and the vehicle commander are in the driving compartment.

The power units and transmission assemblies are located in the engine compartment.

The operator's seat, the armament and its guidance drives, guidance and sighting devices are in the fighting compartment.

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#### Machineguns

Moscow VOYENNYYE ZNANIYA in Russian No 10, Oct 80 pp 28-29

[Article by Col Engr V. Knyazkov under the rubric "Talks With Draftees": "The Machine Gun is Firing"]

[Text] A machine gun (pulemet [bullet-thrower]).... Does this mean that it throws bullets? Generally speaking yes. This is the historical name. And if one were to ask the readers what a machine gun is, many of them would no doubt immediately think of the reknowned horse-drawn machine-gun mounting of the civil war times with a blunt-nosed Maxim on it.

But let us try to provide a precise definition. Just what is a machine gun? In the first place, it is a fire arm in the automatic class. In the second place, it is a team weapon; it is serviced by a crew. In the third place, the machine gun is set up on a support specially designed for this purpose. Finally, this weapon is designed for destroying various targets on the ground, on water and in the air.

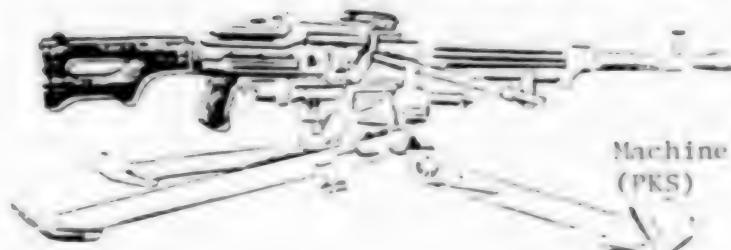


Kalashnikov 7.62mm light  
machine gun (PK)

Kalashnikov  
7.62mm machine  
gun

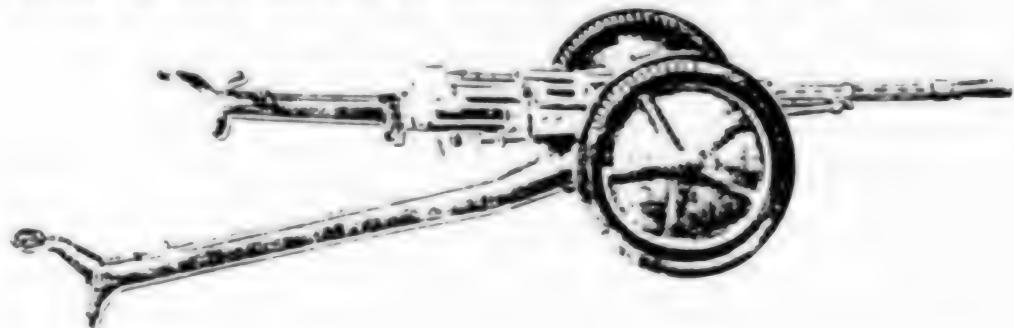


Machine gun on bipod (PK)



Machine gun on mounting  
(PKS)

14.5mm infantry machine gun designed by Vladimirov (PKP)



## Machine Guns

there are the following types of machine guns: infantry and antiaircraft machine guns, machine guns for tanks and armored personnel carriers, casemate machine guns, machine guns for ships and aircraft. They are broken down according to caliber into three groups: small (up to 6.5 mm), standard (from 6.5 to 9 mm) and large (from 9 to 14.5 mm).

Machine guns are either light (ruchmov) or medium (stankovyy), depending upon the specific design. The former are set up on gun rests, the latter on a tripod (less rarely, a wheeled) mount. We even have models which have come to be known as "general-purpose machine guns." What are they like?

Military design does not stand still, and great importance is attached to the standardization and unification of weapons. It is precisely for this purpose that the so-called general-purpose machine guns are being developed to use rifle rounds and are being accepted as the main weapon. Such a machine gun is used on a gun rest as a light machine gun. It becomes a medium machine gun when a mounting is used. The general-purpose machine gun is essentially a lighter version of the standard gun.

One more comment about the classification of machine guns. The reader is already familiar with the term "cyclic rate of fire," which is one of the most important features of a firearm. Machine guns are classified according to this feature as having a standard rate of fire (600-800 rounds per minute) or a rapid rate (3,000 rounds or more per minute). Let me explain here that machine guns with a rapid rate of fire are used for firing at high-speed air targets from the ground and as airborne firearms.

The Soviet Army and Navy have highly diverse machine guns. This is understandable. The differences in the models are determined by their purpose. There is no need to discuss everything in this article, however. Let us look at a few machine guns in the Ground Forces.

The standard-caliber RPK Kalashnikov light machine gun is designed for firing from gun rests with the butt braced against the shoulder. It has good maneuverability and is a powerful weapon of the motorized rifle section, capable of performing missions in modern combined-arms combat. The machine gun is serviced by a single individual. This is very important in combat, of course.

Let us take a look at the basic technical features of the RPK. It has a sighting range of up to 1,000 meters, the same as the AEM [motorized Kalashnikov sub-machine gun]. It also has the same cyclic rate of fire (600 rounds per minute). It has a considerably greater actual rate of fire, however: 150-250 rounds per minute. This is due to the fact that the magazine holds 40 rounds. This means that the machine-gunner will spend less time reloading the gun in combat. It accounts for the greater actual rate of fire.

The RPK fires 7.62mm rounds; the bullets weigh 7.9 grams. It acquires an initial velocity of 745 meters per second upon leaving the bore.

The RPK is relatively light at 5.6 kilograms. Compare that with the Degtyarev RPD light machine gun, which has approximately the same technical features as the

RPK but weighs almost twice as much--9 kilograms. The RPK is also more maneuverable, of course. This is of considerable importance in offensive combat, when the machine-generators have to keep switching positions.

How is the RPK fired? The gunner selects the best position for the area: he can fire from prone position, kneeling or standing. Depending upon the target, he can shell it with short bursts of 3-5 shots or long bursts of 10-15. Sustained fire is also possible.

What are the combat capabilities of the heavy machine gun--the Vladimir KPV large-caliber machine gun, for example? The specially designed mounting gives the machine-gun body good stability, which makes it easier to lay the gun and considerably enhances firing accuracy.

The barrel is the largest in this class of firearms--14.5 mm. Its sighting range is 2,000 meters. A bullet weighs 64 grams, which is actually 8 times heavier than the bullet for the RPK. It also attains very great initial velocity, 990 meters per second. Such a bullet has considerable kinetic energy. This is why a machine gun of this design is intended not just for destroying personnel. It can be used against air targets, as well as enemy weapons, including lightly armored weapons. In this case its most effective firing range is less than 1,000 meters. The machine gun and mounting weigh 47.5 kilograms.

The machine gun's technical rate of fire data are the following. Its cyclic rate of fire is between 550 and 600 rounds per minute. Actual rate of fire depends upon several factors, of course. With belt-feeding (a belt holds 150 rounds), with its large basic ammunition load and effective cooling of the massive barrel, it achieves an actual rate of fire of up to 250-300 rounds per minute.

It can be fired intensively for a considerably period of time without replacing the barrel. It is replaced when it overheats, of course. This operation takes a minimum of time in the field.

We can see from these combat features that the heavy machine gun is the most powerful automatic firearm with which it is possible to conduct sustained fire for a long time.

What are the combat capabilities of the Kalashnikov general-purpose machine gun? It is placed on a gun rest as a light machine gun, on a special tripod when used as a medium machine gun.

The general-purpose machine gun is of standard--7.62 millimeters. Despite this, outstanding designer of firearms N.T. Kalashnikov succeeded in producing a machine gun of relatively light weight: 9 kilograms for the light machine gun (on a gun rest) and 16.7 kilograms for the medium version (on a tripod).

Let us take a look at other combat capabilities of the general-purpose machine gun. It has a large sighting range of up to 1,500 meters. Furthermore, the cyclic rate of fire is greater than that of the RPK and KPV machine guns--650 rounds per minute. It is belt-fed. Belts with capacities of 100, 200 and 250 rounds can be used. A high actual rate of fire is achieved as a result--up to 250-300 rounds per minute, a rate of which only the best medium machine guns are capable. The bullet weighs 9.6 grams and has an initial velocity of 825 meters per second.

The title of this article is "The Machine Gun is Firing." But what is the fire like? How is it effected? Let us take a brief look at the combat employment of these weapons.

It can be used for frontal fire, for example. This means that one or several machine guns direct fire against the target front (that is, perpendicular to its front)--at a line of enemy infantry, for example. This is extremely effective against targets extended a fairly long way on the front and into the depth. Flanking fire is most effective against broad targets, however, since it is aimed precisely at the target's flank (parallel to its front).

There is also a type of fire known as cross-fire. In this case a single target, the one most important in the given sector in the combat situation, is selected for two or several machine guns. The machine guns are dispersed among various positions. This is an important condition for cross-fire, which is conducted from various directions at a single target and is justifiably considered to be one of the most effective types of fire.

Machine-gun fire is described as fire in short or long bursts, or sustained, depending upon its intensity. The number of shots per bursts for medium machine guns with belt-feed is unquestionably greater than that of light machine guns. A short burst may consist of 5-10 shots; a long burst, 20-30.

Sustained fire is used during the most crucial periods of a battle and against the most important targets. This is understandable. The essence of sustained machine gun fire is that the gunner presses the trigger and does not release it until all of the shells in the magazine or on the belt have been used up.

With respect to methods of firing a machine gun, there are two main ones for medium machine guns: pinpoint fire and dispersed fire.

Just what is pinpoint fire? Firing at a single target from a mounting. The distance to the target is carefully determined, the sight is set and the gun is adjusted to the point of aim, after which the laying mechanisms on the mounting are locked in place. The gun is fired in bursts or with sustained fire.

There are several types of dispersed fire for a machine gun. Take fire dispersed along a front, for example. This is employed for destroying broad targets. But first, let us explain the term "dispersion." Particularly since further on we will be discussing so-called artificial dispersion of bullets.

If a machine gun were perfect and if firing and sighting requirements were ideally observed, one bullet would strike another in the target. In reality, however, bullets are deflected--the specialists say "dispersed"--if only slightly, from the point of aim. And the closer the point of aim, the more tightly the bullet holes will be clustered.

For firing at broad targets, however, the dispersion is effected deliberately--that is, artificially. It is produced manually, when the gunner continuously turns the machine-gun barrel and smoothly transfers fire along the front of the point of aim. This destroys enemy personnel within a sector of a certain width.

There is also such a thing as combination fire, in which case there is artificial dispersion simultaneously on the front and into the depth. This is used for destroying targets distributed within a specific area, of course.

Now let us imagine the following scenario. The machine gun has been brought up and positioned in an important sector on the which the commander plans to repel an enemy counterattack. Furthermore, the area is convenient for concealed maneuvering. For example, there might be a gully, a depression or a clearing in the woods, and so forth. The gunner has determined the distance to reference points and identified a good line for opening fire. The machine-gun belt has been inserted into the feed block, the first bullet has been fed into the chamber, and the sight is set for the distance to the open-fire line, which does not exceed the range of direct fire for chest-figure targets (the latter is absolutely mandatory!). The machine gun and the position have been carefully camouflaged. The battlefield is being constantly monitored.

The gunner opens fire at precisely that moment when the enemy reaches the designated line. It is conducted at full intensity, short-range and in just one direction, until the enemy has been destroyed or halted.

This kind of fire, especially from a medium machine gun and particularly a large-caliber one or even a group of machine guns, which is begun unexpectedly and is conducted almost point-blank, as they say, at a cyclic rate of fire of 600 or more rounds per minute, always terrifies the enemy. It is not surprising that this kind of machine-gun fire, as a variation of a tactical principle, has a precise official name. It is called close-range concentrated (kinzhalnyy) fire. It would be appropriate also to mention concentrated fire. The name speaks for itself. It can involve not just machine guns, but also other firearms of one or several subunits. Fire is opened simultaneously, ordinarily at a single target or a certain section of an enemy combat formation. Great fire density is achieved, particularly by the use of machine guns, which results in the rapid destruction or neutralization of enemy personnel.

The machine gun is successfully employed as a sustained-fire, team weapon in all types of combat: in an offensive, in a defense, and in a meeting battle. A well trained and smoothly functioning crew which has studied the parts of the machine gun, has mastered all of the firing techniques and performs with tactical competence with respect to selecting and camouflaging the position, shifting positions rapidly, assessing the enemy, and so forth, will always provide effective fire and inflict considerable damage upon the enemy.

This is borne out also by the Great Patriotic War experience. Excellent machine-gunners enjoyed great respect at the front. They were a real disaster for the fascist infantry.

When fierce fighting was underway on the approaches to Moscow, a situation once developed on one of the sectors of the Western Front, in which machine-gunner Valentin Khametov was left on a small hill together with his loyal friend, his Maxim.

The fascists were climbing the hill like madmen, but Khametov conserved his shells and plastered them deliberately and skillfully. Vigilantly observing the

battlefield, he would wait for the right moment and drag his machine gun to a different position, reload and once again level devastating fire at the enemy in short bursts. Wounded in the arm, he did not abandon the position until reinforcements arrived.

The enemy did not get through. Around the hill lay more than 200 bodies of Hitlerite soldiers and officers mowed down with accurate rounds by the excellent machine-gunner Valentin Khametov. He was awarded the Order of Lenin for this outstanding feat.

The war ended 35 years ago. The Soviet Army and Navy today have different weapons, the most modern, of course. They have tanks with good cross-country ability, missiles with nuclear warheads, supersonic fighters and nuclear-powered submarines. Achievements in cybernetics, electronic computers and guidance systems are extensively used in the military.

All of this is so, but one needs to value also the weapon which the rifleman, the soldier, takes into the attack or with which he defends--that is, the firearm. Furthermore, one must never regard weapons as an absolute and underestimate the human being in combat.

The idea expressed in the simple and wise rule that equipment is powerful only in skillful hands is perhaps accurate. It should be borne constantly in mind that in warfare the equipment only determines the possibility for achieving victory. The homeland's defender turns this possibility into reality.

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#### Individual Small Arms

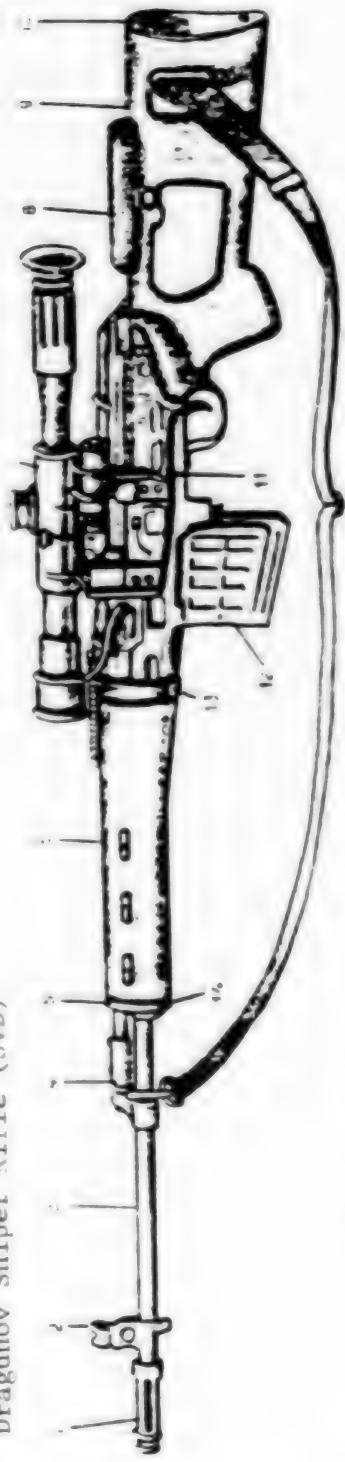
Moscow VOYENNYYE ZNANIYA in Russian No 9, Sep 80 pp 42-43, back cover

[Article by Col Engr V. Knyazkov under the rubric "Talks With Draftees": "Individual Small Arms"; first paragraph is VOYENNYYE ZNANIYA introduction]

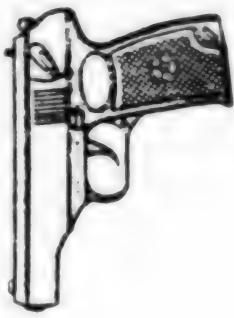
[Text] The editors are beginning the publication under the above rubric of a series of articles on modern weapons and combat equipment of the Soviet Army and Navy. They are written primarily for the young readers, the homeland's future defenders, who are entrusted in the army with servicing and operating the extremely complex units and assemblies of the modern weapon systems created by the advanced technical thinking of prominent Soviet designers and produced by the hands of our talented working class. The articles will tell in popular form about specific models of weapons and equipment, about their technical specifications, about their combat capabilities and about the specific features of their design and their operation, as well as their application and use in various types of combat.

Every serviceman, regardless of where he is entrusted to serve--in the Soviet Army or Navy, in the Border or Internal Security Troops--has an individual small arm: a submachine gun, carbine, rifle or pistol. It is designated for self-defense and for attacking at relatively close range.

Dragunov Sniper Rifle (SVD)



Makarov 9mm Pistol (PM)



Stechkin 9mm Automatic Pistol (APS)



#### Individual Small Arms

##### Key:

1. Flash suppressor
2. Foresight
3. Barrel
4. Regulator
5. Gas chamber
6. Hand guard
7. Optical sight
8. Cheek-piece
9. Stock
10. Butt
11. Casing
12. Magazine
13. Bottom snap ring
14. Upper snap ring

All of us have heard of the submachine gun. Why is it called that? According to the classical definition, the submachine gun is an individual firearm designated for destroying live solitary or multiple targets. It belongs to the class known as sustained-fire weapons. What does this mean? Think of the Simonov carbine, for example. This is one model of an automatic weapon, but only the reloading process is automated. It is therefore called semiautomatic. The trigger has to be pressed for each shot. In other words, the carbine is capable only of single-round fire.

And what about a submachine gun? The trigger only has to be depressed, and rounds are fired one after another until the shells in the magazine are used up or the pressure on the trigger is released. The AKM Kalashnikov modernized submachine gun is one such weapon.

What are its most important technical features, those which, taken together, determine this model's combat capabilities? It is a 7.62mm gun. It has a sight-ing range of up to 1,000 meters--only in clear weather and with good visibility, of course. It has a fairly long direct-fire range of 350 meters. When fired at this distance, the bullet's trajectory will not rise above the height of the target. This is very important in combat, since it means that the firing can be conducted with a constant sight setting corresponding to this range. This simplifies and speeds up the laying of the submachine gun, and when fired at moving targets it is not necessary to constantly adjust the sight.

AKM fire is most effective at ranges of less than 400 meters, within which the conditions for destroying enemy personnel are optimal.

The cyclic rate of fire is one of the most important technical features of the submachine gun, as it is of other weapons. This is determined by the number of rounds which can be fired within a unit of time. It is 600 rounds per minute for the AKM. When the trigger is pressed the shots occur one after another, every 0.1 second. This means that 10 bullets can be shot within a time interval as small as a second. Naturally, the probability of striking the enemy is very high. This is why the military specialists are attempting to increase the gun's rate of fire. And this is precisely the main reason why the submachine gun was developed.

The fact should be stressed, however, that we have thus far been discussing the cyclic rate of fire, or the technical rate of fire, which is defined only by the duration of an operating cycle of the submachine gun's parts. The soldier fires at both moving and stationary targets, however. He must aim in either case, but he must first decide how he will be firing--in bursts or single shots. Reloading also takes time. After using up all the cartridges in the magazine (it holds 30), the soldier must remove the empty magazine and insert a loaded one.... The submachine gun's actual rate of fire, that which is actually achieved, is therefore one of its most important features. Naturally, this assumes particular importance for firing during the most crucial and intense periods of combat--in attacks and counterattacks, for example. When fired in bursts the AKM's actual rate of fire is up to 100 shots per minute; up to 40 per minute when firing single shots.

Density of fire is directly dependent upon the actual rate of fire. This is the number of bullets fired by all types of firearms per kilometer of front in 1 minute.

To explain this let us take a simple, small-scale example. Let us make a simple calculation for a motorized rifle section of nine men. If it is conducting combat on a front of 50-60 meters, with the given actual rate of fire for the submachine gun, the section can achieve a density of fire whereby 15 or 20 bullets will be fired at each meter of front in 1 minute. If each rifleman has good fire training, this assures reliable destruction of the enemy.

An AKM with loaded magazine and without bayonet weighs 3.6 kilograms. Is this a lot or a little? A little, when one considers that the Russian .375 rifle weighed 4.5 kilograms, but the magazine held only five shells.

Incidentally, what about the shells? Designer Kalashnikov developed his submachine gun for the so-called "1943 intermediate round." Why "intermediate"? Was it perhaps something temporary, nonpermanent? No, it was just that the cartridge was between a pistol and a rifle bullet with respect to such features as dimensions, ballistic properties, and so forth. I would like to say one thing in connection with this. The Spaschin PPSH-41 and Sudayev PPS-43 machine pistols are sometimes called submachine guns. There is an external similarity, of course, but the name is essentially incorrect. These models were designed to use pistol bullets and their precise technical name is therefore "machine pistols."

Now, a few words about attachments. The AKM is convenient for hand-to-hand combat. The rifleman can use either the bayonet or the butt. The short bayonet attaches to the barrel. If necessary, the scabbard and bayonet can be used like scissors for cutting through barbed-wire entanglements. The AKM also has a night firing attachment. A special device and special cartridges can be used for flashless and silent fire. All of these things are of considerable importance in situation requiring secrecy and surprise in combat operations.

The Kalashnikov AKMS submachine gun is the same as the AKM in its technical features. One specific design feature should be mentioned, though. Its butt is attached to the casing with an articulated joint. This is why the abbreviated name AKMS contains the letter S, for folding (skladnyayushchiysya).

The butt can be folded (turned) back to reduce the length of the weapon. This is of considerable importance for airborne troops and tankmen, as an example.

The Kalashnikov submachine gun measures up to the most rigid modern requirements. It has great firing effectiveness and is simple to operate. It is reliable and convenient in combat. Its small dimensions and weight make it possible to successfully use the submachine gun in cramped combat conditions: in foxholes, communication trenches and trenches, in populated areas, in woods, and so forth. It is interesting that even the foreign press has not ignored the Kalashnikov submachine gun. An article published in the American magazine NEWSWEEK, for example, stated: "The Soviet short, automatic AK carbine, the inseparable companion of the Viet Cong (a fighter in the Vietnamese People's Army--editor), has

proved to be even more reliable than rocket shells or mortars. It has proved to be far more dependable than the capricious American M-16 rifle."

Each motorized rifle section has a sniper--that is, a specially trained soldier who has mastered the art of marksmanship and can ordinarily destroy a target with the first shot. The sniper is assigned an important mission in a battle. He has to destroy the most important single targets. These are primarily enemy snipers, officers, observers, signalmen, and so forth. He is assigned a special weapon, a sniper's rifle, for this purpose. How does it differ from an ordinary rifle, and what are its combat capabilities?

Let us take a look at the Dragunov SVD 7.62mm self-loading rifle, the most perfect rifle of its kind. The rifle with optical sight but without shells weighs 4.3 kilograms. It is 1,225 millimeters long. The magazine is loaded with 10 sniper cartridges. Outwardly they do not differ from the organic rifle bullets, but they are ballistically more stable, and this is exceptionally important for accurate fire.

A bullet weighs 9.6 grams. It departs the bore with great initial velocity, 830 meters per second. It retains its lethal force a great distance as a result. The SVD fires most effectively at distances of less than 800 meters. Furthermore, all organic rifle cartridges can be used in it for performing various fire missions.

Its sighting range with a conventional open sight is 1,200 meters, which increases to 1,300 meters with an optical sight with fourfold magnification. This increases the sniper rifle's combat capabilities, since the optical sight provides good vision even in poor visibility and improves aiming accuracy. The optical reticle can be lighted for firing at night.

A sniper can fire from various positions, depending upon the terrain conditions and enemy fire: prone, sitting, standing or kneeling. The SVD can also be used for firing at air targets. In the hands of an experienced sniper, a vigilant observer skilled in camouflage, the sniper rifle is a truly awesome weapon.

This was confirmed in the Great Patriotic War. Soviet snipers destroyed tens of thousands of Hitlerites. Lyudmila Pavlichenko, for example, rapidly mastered the art of marksmanship and became a terror even to the fascist snipers. During the time she spent at the front, she personally destroyed 309 Hitlerite soldiers and officers--that is, she succeeded in putting almost a battalion of enemy infantry out of action. Lyudmila Pavlichenko was awarded the great title Hero of the Soviet Union for this outstanding feat.

Now, a few words about pistols as typical representatives of close-combat small arms. They are personal weapons and are designated for destroying enemy personnel at distances of up to 50-70 meters. As examples let us take a look at two Soviet pistols, the Makarov semiautomatic pistol (PM) and the Stechkin automatic pistol (APS). Their technical features are described in the table.

Note the actual rate of fire of the Stechkin pistol. It reaches 40 rounds per minute with single-round fire and 90 rounds per minute with automatic fire in

bursts. The APS functions like a classical machine pistol. This similarity is increased by the fact that a holster stock can be attached to the pistol grip on the APS. This increases its sighting range to 200 meters.

Features	PM	APS
Caliber, mm	9	9
Weight, minus shells, kg	0.73	1.02
Length, mm	160	225
Actual rate of fire, rounds per minute	30	40 (single) 90 (automatic)
Magazine capacity, rounds	8	20
Initial bullet velocity, meters per second	315	340

It uses pistol cartridges with blunt-nosed bullets. This configuration gives them a powerful stopping effect.

The bullets are fed from a flat, box-shaped magazine inserted into the grip. We can see that Soviet firearms measure up to the most rigid requirements of modern combined-arms combat. They have good firing effectiveness, operating reliability and maneuverability.

The submachine guns, rifles, pistols and other kinds are distinguished by handling convenience and operating simplicity. They are of relatively simple design.

It is the prime task of both the draftee and the fightingman in the Soviet Armed Forces to study these weapons to perfection and master their use.

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#### Kalashnikov Semiautomatic Rifle

Moscow VOYENNYE ZNANIYA in Russian No 2, Feb 80 pp 30, back cover

[Article by Col Engr (Res) R. Kogan, Candidate of Technical Sciences: "The Kalashnikov Submachine Gun"]

[Text] The submachine gun came into being in Russia in 1916. The infantrymen needed a weapon capable of sustained fire, like the light machine gun but no larger than the organic rifle in weight or linear dimensions. V.G. Fedorov designed it. The Russian special literature originally called it a "rifle-machine gun," but it was later named a submachine gun by well-known fire arm theoretician N.M. Filatov.

Despite the fact that the testing and combat employment of the submachine gun were successful, it was produced in only individual copies in the situation of the autocracy and czarist Russia's economic backwardness.



Kalashnikov Submachine Gun

Key:

- |                                   |                                 |
|-----------------------------------|---------------------------------|
| 1. Top plate of receiver          | 24. Compensator                 |
| 2. Selector switch                | 25. Hand-grip clamp             |
| 3. Single-round sear              | 26. Recoil spring sleeve        |
| 4. Hammer delay                   | 27. Cleaning rod                |
| 5. Hammer spring                  | 28. Backsight bed               |
| 6. Hammer                         | 29. Hand-grip                   |
| 7. Casing                         | 30. Barrel                      |
| 8. Breech-block carrier           | 31. Magazine spring             |
| 9. Firing pin                     | 32. Magazine                    |
| 10. Breech-block                  | 33. Magazine lock               |
| 11. Backsight slide               | 34. Automatic trigger sear      |
| 12. Breech lock                   | 35. Automatic trigger spring    |
| 13. Sight leaf                    | 36. Trigger                     |
| 14. Sight-leaf spring             | 37. Body locking screw          |
| 15. Gas cylinder lock             | 38. Pistol grip                 |
| 16. Return mechanism              | 39. Stock                       |
| 17. Gas chamber and<br>hand guard | 40. [Accessories case<br>spring |
| 18. Piston                        | 41. Accessories case            |
| 19. Gas cylinder                  | 42. Butt                        |
| 20. Foresight bracket             | 43. Ring                        |
| 21. Guide                         | 44. Bayonet blade               |
| 22. Foresight                     | 45. Latch                       |
| 23. Lock                          | 46. Bayonet grip                |
|                                   | 47. Safety lug                  |

The experience was not wasted, however. It stood Soviet armorers in good stead. The new type of light automatic infantry weapon on which they were working was designed to use a pistol bullet and was given the name "machine pistol." It did in fact combine the combat features of an automatic pistol (small weight and portability) and a machine gun (large firing capacity).

The machine pistols designed by G.S. Shpagin (1941 model) and A.I. Sudayev (1943 model) accepted into the armament gained fame on the Great Patriotic War fronts as simple, light, dependable general weapons. They provided more than 50 percent of the infantry battalions' small-arms fire. Soviet industry produced 6,103,000 machine pistols, now ordinarily called submachine guns, during the period 1 July 1941 to 30 June 1945.

Experience with the large-scale use of machine pistols convincingly demonstrated the need to increase the ammunition capacity of the light automatic firearms.

A cartridge with new ballistic data, weight and dimensions was to occupy an intermediate slot between rifle and pistol bullets. A model designed by N.M. Yelizarov and B.V. Semin and known as the "1943 model 7.62mm bullet" was accepted into the Soviet Army. This opened up new possibilities for the development of small arms.

The first submachine gun which used the 1943 model bullet was designed by A.I. Sudayev at the beginning of 1944. The recoil energy of an unlocked breech mechanism was used for the automatic action. The trigger mechanism made it possible to conduct not only sustained but single-round fire. It was fed from a double-row box magazine which held 30 bullets. The submachine gun had a wooden stock with a pistol grip and even a folding gun rest. A.I. Sudayev submitted a different model for testing in August 1944. It was a submachine gun which incorporated the principle of removing part of the propellant gases through an opening in the barrel wall. The magazine capacity was increased to 35 bullets. A muzzle compensator-brake was installed on the muzzle face to make the weapon more stable during firing.

Other Soviet fire-arm designers helped to develop models of the submachine gun to use the 1943 model cartridge. Attempts to use the well-known principle of blow-back from an unlocked breech mechanism, which had proved itself in the machine pistols, did not produce good results in submachine guns using the 1943 bullet. The breech mechanisms had to be very heavy, which increased the weapon's dimensions correspondingly. The principle of using the energy from part of the propellant gases withdrawn through an opening in the barrel wall proved to be more efficient and successful. M.T. Kalashnikov took precisely this route. He succeeded in producing a light, portable, reliable and rapid-firing submachine gun. Accepted into the Soviet Army with the name "Kalashnikov 7.62mm submachine gun" (AK), it was designated for destroying enemy personnel and had a wooden or metal collapsible butt. The submachine gun with the wooden butt had a removable knife-bayonet for hand-to-hand combat. The trigger mechanism made it possible to conduct automatic or single-round fire. Automatic fire was the main type; sustained or in bursts (short bursts of up to five rounds or long burst of up to 10). The AK was fed from a removable magazine which held 30 bullets. Its firing range was almost twice that of the PPSh [Shpagin submachine gun]. Accuracy was achieved

also as a result of the fact that the moving parts of the submachine gun were already in the forward position at the moment of firing and could not alter the position of the bore axis.

The basic data for the AK are the following: weight without bayonet or bullets, 3.8 kilograms; length without bayonet, 870 mm; barrel length, 415 mm; cyclic rate of fire, 600 rounds per minute; actual rate of fire, up to 40 rounds per minute when firing single rounds and up to 100 rounds when firing in bursts; cartridge weight, 16.2 grams; initial bullet velocity, 710 meters per second; lethal effect, up to 1,500 meters; sighting range, 800 meters.

The submachine gun's main parts and mechanisms are the following: a barrel and casing, a sighting attachment and butt; a breech-block carrier with gas piston; a breech-block; a return mechanism; a trigger mechanism; a gas cylinder and hand guard; a magazine; a bayonet; a hand grip; and a body cover. The submachine-gun outfit includes accessories, a belt and a magazine pouch. The barrel directs the bullet's flight path. It is permanently connected to the casing. The casing unites the parts and mechanisms of the submachine gun. It also provides for the closing of the bore by the breech-block and the locking of the breech-block itself. The casing contains the trigger mechanism, and the butt and pistol grip are secured to it. The sighting device consists of a sight and a foresight. It is an open, ramp sight. The butt provides for convenience of operation; in the back part part of the wooden butt is a recess for accessories and a butt plate with a cover for the recess. The breech-block carrier and gas piston activate the breech-block and trigger mechanism. The breech-block rams the cartridge into the chamber, closes the bore, strikes the detonator cap and extracts the cartridge case from the chamber. The return mechanism returns the breech-block carrier and breech-block to the original position. The trigger mechanism releases the trigger, strikes the firing pin, provides for conducting automatic or single-round fire, halts fire, prevents rounds from being fired from the unlocked breech and provides for placing the submachine gun on safety. The gas cylinder directs the movement of the breech-block carrier. The hand guard prevents the gunner from burning his hand during prolonged fire.

The parts and mechanisms of the submachine gun interact in the following sequence during firing. Part of the propellant gases which follow the bullet rush into the gas chamber through an opening in the barrel wall and press against the front face of the gas piston, forcing it and the breech-block carrier together with the breech-block back to the rear position. As it moves back the breech-block opens the bore, removes the cartridge case from the chamber and ejects it, and the breech-block carrier depresses the return spring and cocks the trigger. The return mechanism causes the breech-block carrier and breech-block to return to the forward position, while the breech-mechanism rams the next cartridge from the magazine into the chamber and closes the bore, while the breech-block carrier removes the automatic trigger sear from beneath the automatic cocking device. The breech-block is closed as it turns to the right and the bolt arms move behind the locking lugs on the casing. If the selector switch is set on automatic, firing continues as long as the trigger is depressed and there are rounds in the magazine. If the selector switch is set on single-round fire, only one shot is produced when the trigger is depressed; the trigger must be released and depressed again in order to fire the next shot.

The design and the dimensions of the submachine gun make it possible to fire it in place or on the move.

After studying the use of this gun in the forces, the designer made some improvements in the existing model. The "7.62mm modernized Kalashnikov submachine gun" (AKM) which has been accepted into the arsenal has better combat and operating features than the AK. The sighting range has been increased from 800 to 1,000 meters. The weight of the submachine gun has been reduced by 700 grams to 3.1 kilograms. The bayonet has been replaced with a knife-bayonet, which can also be used as a saw (for sawing metal) or scissors (for cutting wire and lighting lines). The butt and handgrip have been strengthened, which has made it possible to use them for inflicting blows in hand-to-hand combat. A submachine gun with a folding butt (the AKMS) has been developed for airborne troops and combat equipment crew (raschet, ekipazh) members. It is 240 mm shorter than the AKM, but all of the latter's combat features have been retained.

Changes in methods of conducting combat operations necessitated by nuclear weapons have made it necessary to enhance the infantry's independence in combat. This has made it necessary to increase the effective firing range of the submachine guns and to increase their maneuverability. The Kalashnikov submachine gun produced the best results in testing, and it was accepted into the arsenal. This is the AK-74.

Soviet submachine guns designed by M.T. Kalashnikov are justifiably considered to be the best in the world due to their good combat and operating features, their suitability for industrial production, their reliability and repairability.

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#### 122-mm Self-Propelled Howitzer

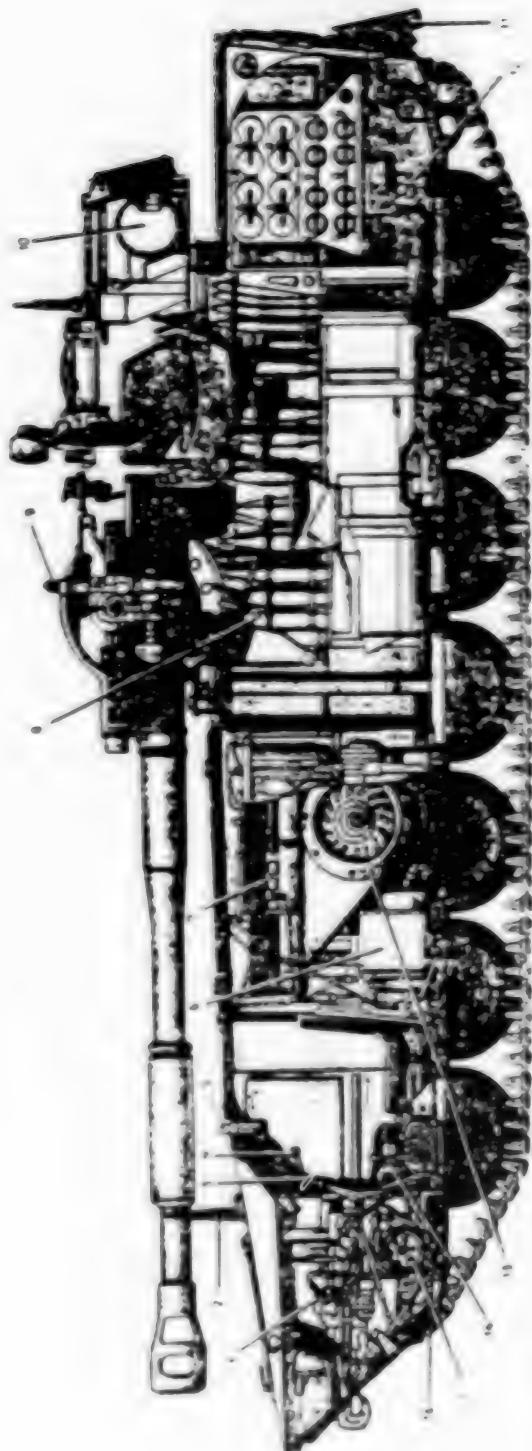
Moscow VOYENNYYE ZNANIYA in Russian No 12, Dec 79 pp 27, back cover

[Article by Col Engr A. Latukhin: "The Self-Propelled Howitzer"]

[Text] As a rule, modern self-propelled guns are armored, tracked vehicles of the ground-to-ground artillery, designated for providing close and accompanying support for troops in combat. They are built either on special bases or on the bases of armored personnel carriers and tanks. They combat enemy tanks, artillery and personnel, destroy enemy command and control posts, radiotechnical and other facilities, and destroy defense installations. Antiaircraft self-propelled guns cover their subunits and units against air attack.

The ground-to-ground guns ordinarily execute their assigned missions by firing from concealed fire positions, but they fire by direct laying when necessary. Their employment on the battlefield makes it possible for the artillery to interact more closely with tank (armored) and motorized rifle (infantry, motorized infantry) units and formations, and they provide continuity of fire support.

Three generations of self-propelled guns can be identified today: the first goes back to World War II, the second to the beginning of the '50s, the third to the '60s. Many first-generation self-propelled guns were created out of tanks and were exposed or were semi-covered with bullet-proof armor. They had a limited



#### Self-Propelled Howitzer

- Key:
1. Pneumatic system
  2. Travel lock
  3. Turning, clutching, braking controls
  4. Main drive control
  5. Observation instruments
  6. Engine warm-up system
  7. Oil system for engine and main drive
  8. [Ammunition] stowage
  9. Measuring instrument mount
  10. Filtration-ventilation unit
  11. Hydraulic equipment
  12. Hydraulic shock absorber
  13. Cooling system jacket
  14. Intermediate reduction gear
  15. Main drive
  16. Driving sprocket

angle of deflection, carried a small ammunition load, were landed separately, and had a small actual rate of fire.

A crew had 8-12 members, and some of these men were landed separately and hurriedly on a motor vehicle together with part of the ammunition load. Up to 20 or more minutes were required to convert the weapon from travel to combat status. Fire positions were prepared in advance. Certain large-caliber guns were secured by special spades in the ground during firing.

Self-propelled artillery units were organizationally a part of mobile formations. Although this generation of guns still did not properly conform up to the requirements of combined-arms combat, they provided the basis for next models.

The self-propelled guns had opponents in various armies. They used the argument that a self-propelled gun is a "rained" tank. In World War II experience, however, and particularly the Soviet Army's successful operations, completely refuted the sceptics. The combat effectiveness of self-propelled artillery became apparent to everyone, and it continued to be developed.

The second generation of self-propelled guns were also created out of tanks -- new ones, however--and continued to be covered or semi-covered with battle-proof armor. They were no longer inferior to tanks with respect to mobility or cross-country ability, however.

New anti-recil devices cut the distance the barrel reciled when fired almost in half. Hydraulic, spring actuated rammers and loading mechanisms were successfully used, which made the loader's job easier and increased the rate of fire. The angles of deflection were increased to 60-120 degrees. Each gun was equipped with a radio and an intercom system. The time required to convert the gun from travel to combat status was reduced to 3 minutes.

The third generation of self-propelled guns were made smaller and lighter to give them buoyancy and to make it possible to transport them by motor vehicle (some of them can even be landed by paraplane). The gun itself is mounted in a fully rotating turret, and the self-propelled gun has power-driven lifting. Some models have automatic loading devices to enhance their rate of fire. They are sealed and have air filtration systems for protection against weapons of mass destruction.

Self-propelled guns have greater combat effectiveness than towed guns, and they therefore form the backbone of the ground-to-ground artillery of our army.

Let us take a look at the arrangement of the self-propelled gun, with a modern Soviet self-propelled artillery piece, which has good combat and operational features. It is armed with a 122mm howitzer and has a sealed, armored hull, a fairly large power unit, electrical and special equipment, communication and observation equipment. The artillery gun, installed in a rotating turret, is designated for combatting enemy personnel, weapons and mechanized equipment.

A muzzle brake on the howitzer barrel absorbs some of the recoil energy during firing, and an ejector blows out the bore and clears the flight in preparation

of powder gases. There is a vertically operated, wedge-type breech mechanism in the breech end, and the cradle is installed in a turret. When fired, the barrel recoils along the cradle slides and is then forced back to its initial position by a recuperator. A fixed and a folding deflector protect the crew members from being struck by receding parts. A running mechanism is used to simplify loading, and there is a cartridge case ejector. Laying for deflection is accomplished by means of an electric (for approximate aim) and a manual (precision) drive.

A periscopic sight installed in the turret makes it possible to fire from concealed positions or by direct laying.

The howitzer's basic ammunition load included HE fragmentation, hollow-charge, smoke, illuminating and propaganda shells.

The power unit consists of an engine with fuel, lubrication, cooling and air-purification systems. The running gear consists of tracks, driving and idler wheels with track tensioners, road wheels, and suspension systems. The electrical equipment includes storage batteries, a generator, a lighting system and individual electric power consumers. The vehicle carries a considerable fuel supply, 550 liters.

There is external communication and intercom equipment. The intercom equipment is for communication between the commander of the self-propelled piece and the members of the crew. The external communication equipment consists of a transceiver. The observation equipment is used by the commander, the mechanic/driver and the gunner.

The main technical feature of the 122mm self-propelled howitzer are the following: shell weight, around 22 kilograms; maximum firing range, 15 kilometers; total weight of self-propelled unit, less than 16 tons; running distance on one fueling, 500 kilometers. The howitzer has a firing elevation range of -3 to +70 degrees and a 360-degree range of deflection. It takes no more than 2 minutes to convert the gun from travel to combat status. The tracks exert only 0.5 kilogram of pressure per square centimeter of ground. The howitzer can travel at more than 60 kilometers per hour on a highway and can move at up 4.5 kilometers per hour afloat.

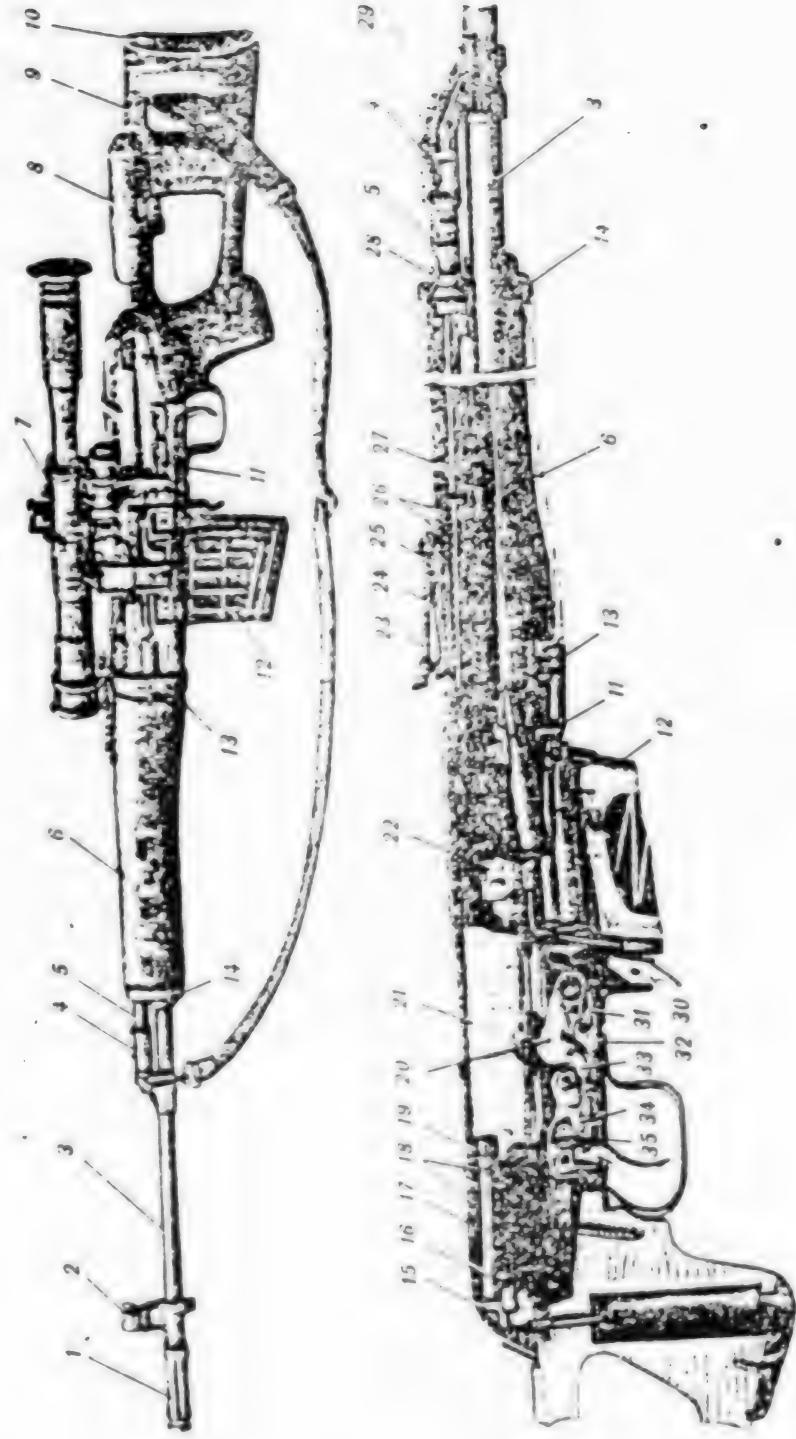
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#### Dragunov Sniper Rifle

Moscow VOYENNYE ZNANIYA in Russian No 3, Mar 78 pp 40, back cover

[Article by Lt Col Engr V. Botin: "The Sniper Rifle"]

[Text] Just who is a sniper? Any person with only a slight knowledge of military affairs could probably answer this question. The sniper is an excellent marksman with a superb mastery of the weapon and of camouflage and observation techniques.



Dragunov Sniper Rifle

Key

- |     |                  |     |                       |     |                   |
|-----|------------------|-----|-----------------------|-----|-------------------|
| 1.  | Flash suppressor | 13. | Bottom snap ring      | 25. | Leaf spring       |
| 2.  | Foresight        | 14. | Upper snap ring       | 26. | Push rod spring   |
| 3.  | Barrel           | 15. | Shackle               | 27. | Push rod          |
| 4.  | Regulator        | 16. | Main spring guide     | 28. | Piston            |
| 5.  | Gas chamber      | 17. | Top plate of receiver | 29. | Gas cylinder      |
| 6.  | Hand guard       | 18. | Return spring         | 30. | Magazine catch    |
| 7.  | Optical sight    | 19. | Barrel bushing        | 31. | Automatic trigger |
| 8.  | Cheek-piece      | 20. | Cock                  | 32. | Hammer spring     |
| 9.  | Stock            | 21. | Breech-block carrier  | 33. | Trip lever        |
| 10. | Butt             | 22. | Breech-block          | 34. | Sear              |
| 11. | Casing           | 23. | Backsight leaf        | 35. | Safety            |
| 12. | Magazine         | 24. | Backsight bed         |     |                   |

Accurate fire by individual soldiers assumed great importance even during the static period of [?]. They destroyed enemy commanders and observers, and shot at gun positions and other important targets. Such riflemen began to be specially selected, trained and provided with observation devices and the best weapons. Sniper subunits soon came into being in all the armies.

Snipers began to be used on a large scale in our army during the Great Patriotic War. Many fightingmen who handled their weapons skillfully destroyed several hundreds of fascists each and were awarded the great title Hero of the Soviet Union.

In the beginning snipers were armed with ordinary magazine-type rifles with the best action. These were then replaced with rifles produced by a special technology, which had optical sights.

The 7.62mm 1891/30 model rifle was the first sniper rifle used in the Red Army. It differed from an ordinary rifle in its greater accuracy (the barrel was manufactured with a technology which produced a straighter and smoother bore) and its PT optical sight. The latter was replaced fairly rapidly with VT and PU sights, to be sure. The sight was attached by means of a bracket set into a special notch on the stock. The PU sight had 3.5-fold magnification and a field of view of 4.5 degrees. It was short (169 mm) and light (270 grams).

Unfortunately, the first rifle had shortcomings along with its many merits. Among other things, the sniper had to stop observing the battlefield while reloading the weapon, and this negatively affected his fire at newly appearing and moving targets. The weapons designers therefore worked persistently to develop new models.

In 1940 the Red Army received the 7.62mm semiautomatic sniper rifle (the SVT-40) designed by F.V. Tokarev. It had a PU sight. The automatic action of the SVT used the withdrawal of power gases through an opening in the barrel. Using their energy for reloading reduced the amount of time required for an aimed shot and made it possible to observe the target continuously. The accuracy of the semiautomatic rifle was as good as that of the magazine-type rifle, and it was somewhat lighter than the latter.

Following the Great Patriotic War it became necessary to develop a new sniper rifle. Designer Ye.F. Dragunov came up with the best design. The automatic action which he developed for the semiautomatic 7.62mm rifle (the SVD), like that of the F.V. Tokarev rifle, used the energy of powder gases diverted through a lateral opening in the barrel wall.

During firing part of the powder gases behind the bullet enters the barrel through the opening in the barrel wall, presses upon the front piston face, which is forced back into the rear position along with the push rod and breech-block carrier. As the breech-block carrier moves back, the breech-block returns and carrier compresses return springs and cocks the trigger (placed at the bottom of the automatic cocking sear) and is then forced to the front position by the return mechanism. The breech-block rams another cartridge into the chamber and drives

the bore (with a turn of the breech-block to the left, its locking lugs fit into grooves in the casing). The cocking lever stops on the sear notch. The trigger only has to be released and pressed once again to fire the next round. If the bullets in the magazine have been used up, the breech-block carrier stops in the back position (the magazine platform lifts the bolt catch, and the breech-block moves forward and catches on it).

The rifle always fires single rounds, whether it be sniper rifle rounds, ordinary, tracer or armor-piercing incendiary bullets. The rifle is fed from a box magazine which holds 10 rounds. The actual rate of fire is 30 rounds per minute. The rifle fires most effectively at distances of up to 800 meters. Sighting range is 1,300 meters with the optical sight, 1,200 with the open sight. Direct firing range is 430 meters at a chest-figure target, 640 at a running target. The bullet retains its lethal effect up to 3,800 meters. The rifle weighs 4.3 kilograms without the knife-bayonet, with an empty magazine, with the optical sight (it weighs 0.58 kilogram) and with the cheek-piece. It is 1,225 millimeters long without the knife-bayonet (the same as the SVT-40).

The PSO-1 optical sight with fourfold magnification and a field of vision of 6 degrees is the main sighting device. It consists of mechanical and optical parts. The former includes the sight body, top and side handwheels, a device for lighting the sight reticle, a sliding shade, a rubber eye guard and a cover.

The top handwheel is used for getting the necessary sight setting (target range), and the side handwheel is for making lateral adjustments. The reticle is lighted by a battery-powered bulb fitted into the sight body for firing at dusk and at night. The sight reticle is lighted by a winter device at winter temperatures of plus 2 degrees centigrade and lower. In this case the battery is housed in a special device carried in the pocket of the sniper's uniform (overcoat). The device is connected to the bulb by a shielded cord.

The optical part of the sight includes an objective lens, an erecting system, the reticle, a luminescent screen and an eyepiece.

Unlike the PU, the reticle of the PSO-1 has inscribed on it the main (top) angle bracket for sighting at ranges of up to 1,000 meters, an aim-off graticule making it possible to precisely consider the cross-wind and the speed of movement of targets, a range scale and an additional angle bracket.

The range scale consists of a solid horizontal and a dotted curve line. By positioning a target 1.7 meters tall between the solid line and the curve, the rifleman can determine the distance to a target every 100 meters up to 1,000 meters. If the target is taller or shorter than 1.7 meters, the distance determined from the scale must be multiplied by the ratio of the target's height to 1.7 meters. The additional angle brackets make it possible to fire more accurately at ranges of 1,100-1,300 meters.

Unlike other optical sights for sniper rifles, this one has a luminescent screen for detecting sources of infrared light and firing at the targets given away by it. The screen is a thin plate made of a special chemical compound placed between sheets of glass. The plate is recharged during the day by training the covered screen toward a window with a light filter. The screen is also set up like this for firing under ordinary conditions.

A mechanical, open sight consisting of a backsight bed, a laminated leafspring, a backsight leaf with a clamp and a foresight is used if the PSO-1 is not working. The open sight is also used for verifying the rifle's effect and for zeroing it in.

For firing convenience and to make the weapon lighter the rifle stock has a groove which forms a grip, a slot for locking the cheekpiece on the butt and an opening with a swivel for attaching the sling. The cheekpiece, which consists of a wooden base with a soft covering, is installed on the rifle only for firing with the optical sight.

The rifle outfit includes accessories for dismantling, cleaning and oiling it (a cleaning rod, a pull-through, a cleaning brush, a screwdriver, a drift, a container and a lubricator), spare parts for the optical sight (spare batteries and bulbs, a light filter, a screwdriver-and-wrench, a swab and a rubber cap), a cover for the optical sight, a pouch for carrying the winter lighting device for the reticle, spare batteries and the lubricator, a pouch for storing the optical sight and magazines (it also contains accessories and some of the spare parts and tools).

The rifle is usually fired from a rest (prone, kneeling or standing, depending upon the height from which the sniper determines he should fire) and from behind a shelter (a tree, the corner of a building, a ditch or a trench). The rifle should be held with the hand guards in the palm of the left hand, the latter supported on a rest, while the right hand grips it by the forward part of the butt, or with the hand guards resting upon something and the magazine or the bottom part of the butt gripped in the left hand. The rifle can also be fired on the move (shouldering it sharply during a brief halt), from an armored personnel carrier (stationary or during a brief halt), or from skis.

The 7.62mm Dragunov sniper rifle in the arsenal of the Soviet Army is one of the most advanced weapons of its kind. It is distinguished by good action. When firing with the optical sight, from a prone position with the rifle on a rest, or standing in a trench, a trained rifleman needs only one shot to strike a waist-figure or running target at a distance of 600 meters, and one or two shots respectively at 1,000 meters. The rifle is trouble-free if the rules for operating and servicing it are strictly observed.

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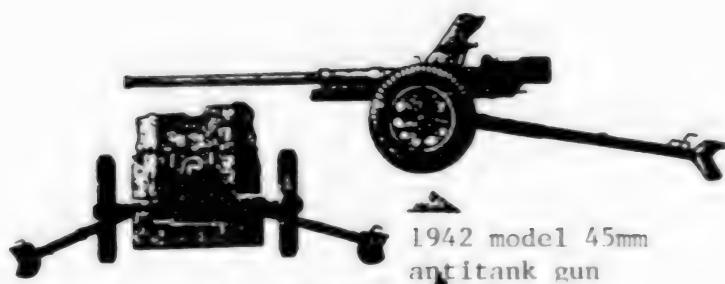
#### Antitank Artillery

Moscow VOYENNYYE ZNANIYA in Russian No 6, Jun 78 pp 36-37, back cover

[Article by Col Engr A. Latukhin: "Soviet Antitank Artillery"]

[Text] The appearance of tanks on the battlefield immediately raised the urgent question of a means of combatting them. Conventional field artillery was used in the beginning. In October of 1920, for example, during the fighting on the Kakhovka bridgehead, artillerymen of the 51st Rifle Division commanded by V. Blyukher, firing a 1902 model 76mm gun and a 1910 model 107mm gun by direct laying, destroyed seven of Vrangel's 12 tanks in a single day. The rest were put out of action or captured.

СОВЕТСКАЯ  
ПРОТИВОТАНКОВАЯ  
АРТИЛЛЕРИЯ

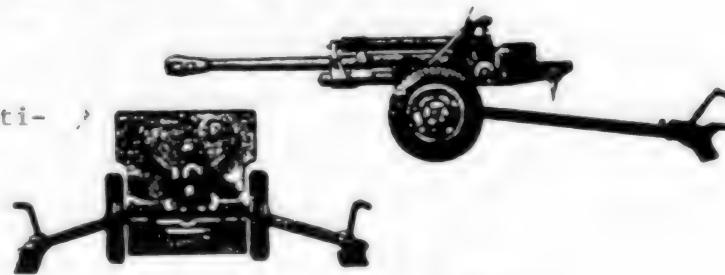


1942 model 45mm  
antitank gun

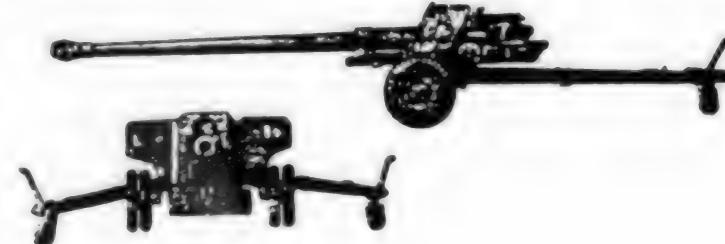
1943 model 57mm anti-  
tank gun



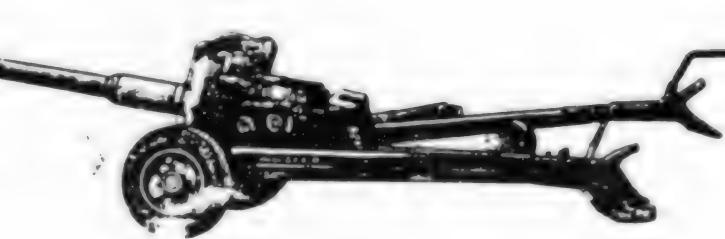
1942 model 76mm anti-  
tank gun



1944 model 100mm  
field gun



85mm antitank gun



Soviet Antitank Artillery

The further development of armored equipment demanded that the artillery be improved, however. The Commission for Special Artillery Experiments (KOSARTOP) was established on 17 December 1918 in revolutionary Petrograd on V.I. Lenin's initiative. It was the first Soviet scientific center for work on problems of artillery development.

KOSARTOP united the most prominent artillery designers and other artillery specialists and focused their efforts on resolving the most important, long-range problems and accomplishing specific tasks in the development of artillery equipment, including antitank artillery. Experimental 45mm antitank guns designed by F. Lender and A. Sokolov were developed as early as 1924-1925. The actual provision of our army with modern artillery weapons was begun in 1927. This was done in two ways: by modernizing old guns remaining from World War I and by producing new Soviet models.

After the modernization the 1902/30 model 76mm gun, the 1910/30 model 107mm gun and the 1915/28 76mm antiaircraft gun could be used for combatting tanks. These guns were still not purely antitank guns, however. And the constantly increasing quantity of armored equipment in the armies of the capitalist states demanded the development of special antitank artillery.

The development and testing of the 37mm antitank gun were successfully completed in 1930. It had completely satisfactory technical features (shell weight, 0.666 kilogram; initial velocity, 800 meters per second; firing range, 4,000 meters). It was accepted into the Red Army's arsenal in February of 1931. Its design was distinguished by new technical features: a carriage with split trail, a partly automated, wedge-type breech mechanism (the breech mechanism was opened manually but closed automatically). The gun retained the traditional physical shortcomings of artillery of the '20s, however: it had wooden wheels and lacked spring suspension.

The 1932 model 45mm antitank gun was developed out of the 37mm gun and was rapidly accepted into the arsenal (in March of 1932). It was one of the best guns of its time (rate of fire, up to 20 rounds per minute; shell weight, 1.43 kilograms; firing range, 4,400 meters). Because it lacked spring suspension, however, it could only be towed by horses.

The new 1937 model 45mm antitank gun accepted into the arsenal in June of 1938 was distinguished not only by good ballistic features but by good design features as well. It was capable of piercing the armor of all types of tanks in the armies of the capitalist states at that time. The gun's rate of fire was increased by a new semiautomatic breech mechanism and a push-button starter on the elevating handwheel. It had spring suspension, which meant that it could be towed over various kinds of roads at higher speeds. The gun's combat features were superior to those of the Rheinmetall 37mm (German), the British 40mm and other foreign antitank guns.

Because of the possible development of tanks with enhanced armor protection, it was planned to develop a more powerful antitank gun, which could pierce 50mm armor at a distance of 1,000 meters. The first test models of such a gun were produced as early as February 1941. It was a 57mm gun.

When Hitlerite Germany unleashed the war against the Soviet Union, it was counting on ending it victoriously within a very short period of time and placed its main hopes on its tank and motorized troops supported by extensive air forces. Our infantrymen, tankmen, airmen and sappers waged a fierce battle against them. The main burden fell upon the artillerymen, however, upon special antitank artillery subunits, units and formations.

An order issued by the People's Commissariat of Defense on 1 June 1942, which changed the name of the antitank artillery to tank-destroyer artillery, was extremely important in enhancing the role of our antitank artillery and improving the combat skill of its personnel. It specified a large number of measures for attaching soldiers and officers with experience in combatting tanks to the anti-tank artillery. Among other things, antitank officers (from platoon commander to division commander inclusive) were placed on a special roster and were subsequently assigned only to the tank-destroyer artillery. Wounded NCOs and lower ranking men were always returned to their units after recovering in a hospital. A special sleeve insignia was established for personnel of the antitank artillery. A gun crew received a bonus for each enemy tank put out of action, and the number of tanks put out of action by a gun was indicated with a special mark on its shield.

Soviet antitank artillery rapidly grew and improved during the Great Patriotic War. New guns were developed, tested and accepted into the arsenal within short periods of time.

The 45mm antitank gun developed in 1942 differed considerably from its predecessor (the 1937 model). It had a greater initial shell velocity (870 instead of 760 meters per second) and direct firing range (950 instead of 860 [meters]). Its armor-piercing capability with a conventional armor-piercing shell was increased markedly by increasing the weight of the powder charge, increasing the pressure of the powder gases in the bore, and lengthening the latter.

The 57mm antitank gun accepted into the arsenal in June of 1943 had superb ballistic features. It was inferior only to the 100mm field gun in armor-piercing capability.

The 1942 model 76mm guns which replaced the 1939 model 76mm gun with identical ballistics and armor-piercing capability were more than 300 kilograms lighter, of simpler design and more convenient to operate.

The 1944 model 100mm field gun was a response to the appearance of new German Tiger and Panther tanks and the Ferdinand self-propelled gun with enhanced armor protection. It could reliably destroy any enemy tank. It had a unique and well-functioning design: a monoblock barrel with muzzle brake, a semiautomatic, vertically operated wedge-type breech mechanism, a carriage with split trail. It was the first to have torsion suspension.

New types of ammunition for combatting tanks were developed for Soviet artillery during the war. The use of subcaliber shells considerably increased the capabilities of the 45mm, 57mm and 76mm guns. Their armor-piercing capability was increased by 20-50 percent (depending upon firing range). The subcaliber shell made it possible to achieve for the 57mm gun an initial velocity of 1,270 meters per second, the greatest of the entire World War II. Hollow-charge shells with relatively small initial velocity were received for the artillery guns (the 1927

and 1943 models of the 76mm regimental gun and the 1938 model 122mm howitzer). This made their antitank fire considerably more effective.

Soviet self-propelled guns--the SU-85, SU-100, ISU-122 and ISU-152--were successfully employed along with towed artillery for combatting tanks. The Soviet self-propelled guns were ordinarily of a caliber one level above that of the tank on whose chassis the gun was mounted. Our IS heavy tank was armed with an 85mm and then a 122mm gun, for example, while the self-propelled units created out of it were 122mm and 152mm respectively.

The Soviet artillery received a number of new models following the war for combatting armored targets. The D-48 85mm antitank gun was one of them. Compared with the 1944 model 100mm gun, it has better armor-piercing features, longer direct firing range and twice the rate of fire, and weighs 1,300 kilograms less.

Its basic ammunition load includes armor-piercing and tracer (9.3 kilograms) and HE fragmentation shells (9.7 kilograms) with full or reduced charges. The greatest initial velocity of an armor-piercing and tracer shell is more than 1,000 meters per second, and the greatest firing range for an HE fragmentation shell with full charge is 19 kilometers. The gun's maximum rate of fire is 15 rounds per minute; elevation, minus 6 to plus 35 degrees; traverse, 54 degrees. The gun weighs 2,350 kilograms in combat status. It takes 1-1.5 minutes to convert the gun from travel to combat status. It travels at up to 60 kilometers per hour on roads.

The gun consists of a barrel with a breech mechanism and carriage, which includes a cradle, anti-recoil devices, a saddle with laying mechanisms, a gun shield and balancing gear, a saddle support with split trail, wheels and axle assembly with spring suspension, and sighting devices.

A muzzle brake on the front end of the barrel is designed to absorb the recoil energy. It has an axial opening for the departure of the shell and lateral openings (windows) for the exiting of the powder gases. The use of a highly efficient muzzle brake (it absorbs around 70 percent of the recoil energy) made it possible to significantly reduce the load on the carriage and the overall weight of the gun.

The breech mechanism is used for locking the barrel firmly and securely, firing the shot and ejecting the spent cartridge. The 85mm gun has a semiautomatic, vertically operated wedge-type breech mechanism.

The cradle guides the barrel during recoil and counterrecoil, and the recoil system is attached to it. It consists of a cast cylindrical bracket. The cradle rests on trunions on the saddle and can be moved vertically (along with the barrel) by means of an elevator gear.

The recoil system brakes the recoiling parts of the gun during firing, smoothly returns them to their initial position and reliably holds them in the extreme position until the next round is fired at any angle of elevation. It consists of a hydraulic recoil absorber and a hydropneumatic recuperator. The recoil absorber and the recuperator are attached to the barrel bracket, and their rods are in lugs on the cradle. The buffer and recuperator cylinders recoil along with the barrel when the gun is fired, while their rods remain in place.

The saddle provides a foundation for the gun's rocking parts--that is, the cradle and recoiling parts. The elevating and traversing mechanisms, the balancing gear, the shield and sighting devices are also located on it.

The balancing gear is designed for relieving the load on the elevating gear and making it easier to lay the gun vertically. It is a pneumatic mechanism with a hydraulic air seal. Pressure is adjusted by means of a gravity tank for changes in the outside temperature.

The saddle support provides a foundation for the rotating part of the gun. It consists of a front casing, to which is attached by articulated joints the split box trail with fixed spades which rest on the ground. Mounted on the trail are a device for securing the gun in travel status, a draw bar for connecting the gun to the hook on the tractor, and a support roller.

The gun has a wheel and axle assembly with two wheels. The wheels are filled with foam rubber. The torsion suspension is engaged and disengaged automatically when the trail is opened or closed. It softens the bumps and jars when the gun is traveling.

The gun shield protects the crew and the gun's mechanisms from bullets, shell and mine fragments. It also reduces the harmful effect of the muzzle wave. The gun shield consists of the main shield, which is secured on the saddle, and two moveable deflectors (upper and lower).

The gun's sighting devices consists of two sights: mechanical (for firing from concealed positions or by direct laying) and optical (only for firing by direct laying).

With respect to technical features and design the 85mm gun is one of the most advanced antitank artillery pieces.

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#### Improved Kalashnikov Semiautomatic Rifle

Moscow VOYENNIYE ZNANIYA in Russian No 9, Sep 74 pp 10-11, back cover

[Text] It is easier to master small arms for those who have studied them prior to induction into the army, those who know the basic rules for handling them and have acquired basic firing skills. To help those who are studying military affairs in schools, vocational and technical schools, at DOSAAF training centers and in DOSAAF training organizations, beginning with this issue of the magazine we are publishing articles on the specific features of the main models of small arms.

The submachine gun (see back cover) is an individual weapon designated for destroying enemy personnel with fire or with the bayonet. The name of the gun itself indicates the possibility of automatic fire (after the gunner has pressed the trigger the shot is fired and the gun is reloaded without his participation). Fire can be sustained until the shells in the magazine have been used up. It can be in long or short bursts. Single-round fire--individual shots--is also possible.

Improved Kalashnikov submachine gun  
(main parts and mechanisms)



The submachine gun has a sighting range of 1,000 meters. The most effective fire for an individual submachine gun is at ranges of up to 400 meters; massive fire, whereby several gunners shoot at a single target, up to 800 meters for ground targets and 500 meters for air targets. The direct firing range at a chest-figure target is 350 meters for the AKM (improved Kalashnikov submachine gun); 525 meters at a running person.

The manuals ordinarily indicate the cyclic and actual rates of fire for a gun. The former describes the technical capabilities of the gun--that is, the speed at which its mechanisms can operate. The actual rate of fire is the figure indicating how many aimed shots can be made by a gunner (taking into account the time needed to reload). The AKM submachine gun has a cyclic rate of fire of 600 rounds per minute, an actual rate of 100 rounds, and a rate of up to 40 shots per minute with single-round fire. A single magazine holds 30 shells.

The submachine gun with loaded magazine weighs 3.6 kilograms. The knife-bayonet with scabbard weighs 0.45 kilogram. The design of the submachine gun and its main parts and mechanisms are shown in the drawing.

The casing is the part which joins together all of the other parts and mechanisms. The stock and barrel are rigidly attached to it, and the sighting device is attached to the latter. These parts are not broken down when the submachine gun is dismantled and assembled, and they comprise one of its main parts. The parts are the body cover, the breech block carrier and gas piston, the breech block, the return mechanism, the gas cylinder (with hand guard), the firing and trigger mechanism, the handgrip, the magazine and the knife-bayonet. The automatic part uses the energy of gases formed during firing for reloading the weapon and preparing it for the next shot. This is how it occurs.

After the bullet has passed through most of the barrel, part of the powder gases enter the gas cylinder through a slanted opening in the barrel wall. The gases press against the front face of the piston, setting it into motion. The piston then slides the breech block carrier along slides in the casing, overcoming the resistance of recoil springs. The breech block carrier, drawing the breech block carrier with it, first turns it somewhat, opens it and then moves back together with the cartridge, which strikes a deflector and is ejected.

I would note that the powder gases give only the initial impetus to the large parts (the piston, the carrier and the breech block). As soon as the bottom part of the breech block carrier passes the feed block mouth, the next shell is raised by the action of a spring. At the same time the breech block carrier moves back, turns the hammer on its axis and twists the hammer spring. The functioning of the trigger mechanism then depends upon the position of the fire selector lever. If it has been set for automatic fire (the setting indicated on the casing with the letters AV) the cracked hammer is retained only by the automatic trigger sear.

When the breech block carrier reaches the extreme back position, it stops and begins to be pressed forward by the return spring, together with the breech block and piston. The breech block forces the next round from the magazine (the remaining rounds are forced upward by a spring in the magazine), rams it into the chamber and turns on its axis to close the bore. The breech block carrier continues to move and removes the automatic trigger sear, releasing the hammer.

The latter strikes the firing pin, producing a shot, and the entire process will be repeated until the gunner releases the trigger.

When the fire selector switch is set at the OD (single round) position, the functioning of the trigger mechanism is somewhat different. After the first shot is fired the automatic parts and mechanisms perform the same operation as in the case of automatic fire. In this case, however, the single-round sear turns together with the trigger. After the latter reaches the extreme rear position, the sear notch slips over the sear. The trigger remains in cocked position, and the next round will not be fired until the gunner releases the trigger and presses it again.

In conclusion, something about two devices which are not always used in other models of small arms. I refer to the delay mechanism and compensator (4 and 24 in the drawing).

The name "hammer delay mechanism" precisely defines its function: it reduces the hammer's speed of action. When the hammer is released and is turned by the hammer spring, it does not immediately interact with the firing pin. It first strikes a catch on the delay mechanism. The latter turns, positioning its front lug to be struck by the hammer. The hammer thus strikes three times in succession: it strikes the catch on the delay mechanism, its front lug and only then, the firing pin. During this time the submachine gun barrel, which has been struck by the breech-block carrier, is able to return to something close to its initial position.

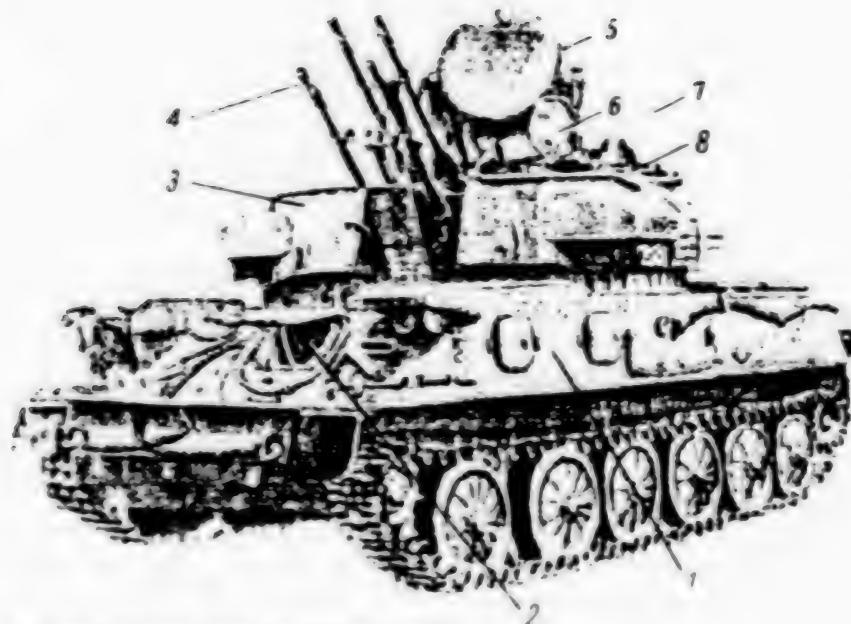
The moment the bullet leaves the barrel, the redistribution of weight and the reactive force tend to deflect the muzzle to the right and upward. This phenomenon is well known to gunners. The compensator--a sleeve with a slanted cam screwed onto the barrel--is needed to reduce the barrel recoil (this is particularly important when firing from the arm while moving). Inside the lug is a groove which forms a compensating chamber, and a collar. The powder gases which follow the bullet through the barrel enter the chamber and create excess pressure, which deflects the muzzle of the submachine gun to the left and downward. Firing stability is increased.

The AKM is a simple and reliable submachine gun with excellent combat features.

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Self-Propelled Antiaircraft Gun System ZSU-23-4

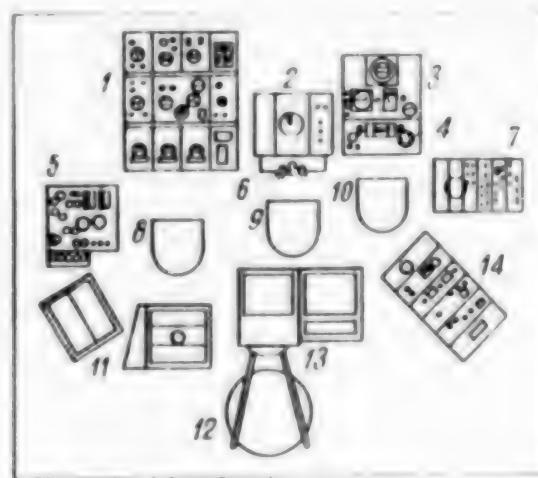
Moscow VOYENNNYE ZNANIYA in Russian No 12, Dec 76 back cover



**ZSU-23-4 Self-Propelled Antiaircraft Gun**

**Key:**

- |                            |                          |
|----------------------------|--------------------------|
| 1. Hull                    | 5. Radar antenna         |
| 2. Mechanic/driver's hatch | 6. Commander's hatch lid |
| 3. Turret body             | 7. Radio antenna         |
| 4. Gun barrels             | 8. Commander's turret    |



**Arrangement of Instruments in Turret**

**Key:**

- |                                      |                                    |
|--------------------------------------|------------------------------------|
| 1. Computer                          | 8. Commander's seat                |
| 2. Radar scanner                     | 9. Scanner/gunner's seat           |
| 3. Range finder's panel              | 10. Range finder's seat            |
| 4. Range wheel                       | 11. Power unit cabinets            |
| 5. Commander's panel                 | 12. Radar antenna                  |
| 6. Control handles                   | 13. Antenna column and radar parts |
| 7. Cabinet for antenna control units | 14. Cabinet for radar units        |

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## Mortars

Moscow VOYENNYYE ZNANIYA in Russian No 7, Jul 76 pp 42-43, back cover

[Article by Lt Col Engr V. Botin: "Mortars"]

[Text] Slightly more than 70 years have passed since the first mortar was produced. During that time, however, it has changed from a primitive gun into a powerful weapon and assumed solid status in the armament systems of all nations.

The first mention of mortars goes back to the time of the Russo-Japanese War. It was a Russian mortar.

The new weapon's success evoked interest in other nations. Various mortars and bomb-throwers appeared in the arsenals of all the armies fighting in World War I.

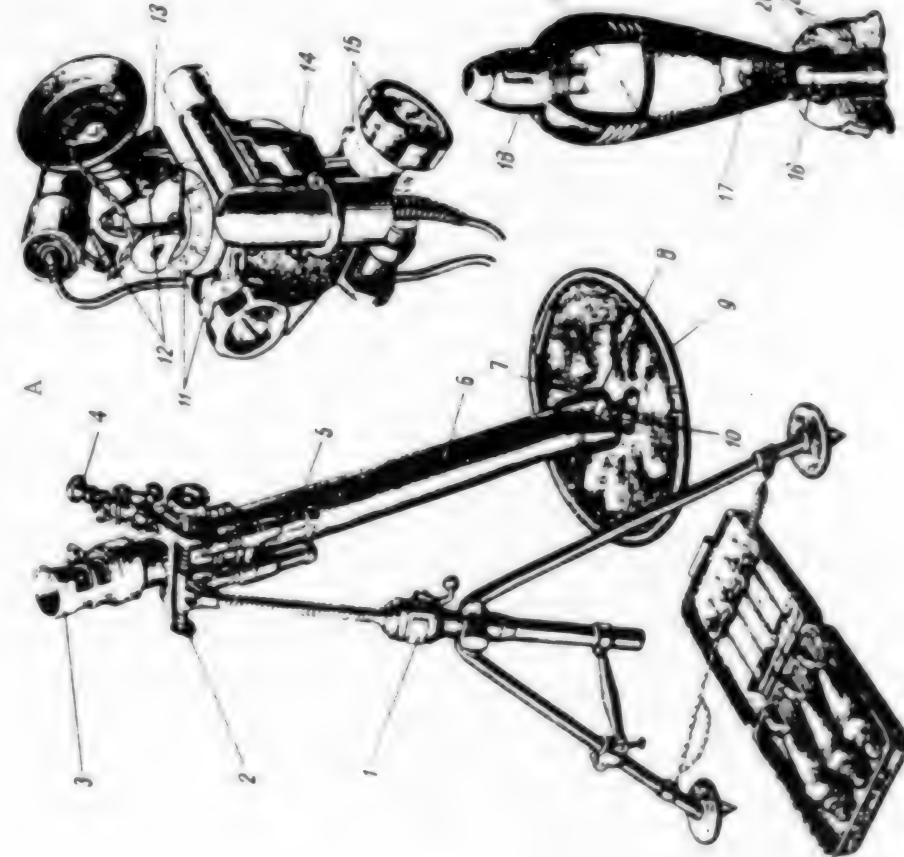
Mortars began to be improved in our nation following Great October. A group headed by artillery engineer N.Z. Dorovlev, among others, concluded after studying various designs and performing tests that a smooth-bore mortar which fires fin-stabilized shells is best for providing direct infantry support in combat. The group defined the mortar's basic design--barrel, bipod mounting and base plate. Most modern mortars are of this design.

A team of designers headed by B.I. Shavyrin, subsequently awarded the title Hero of Socialist Labor, the Lenin and State Prizes, made a significant contribution to the development of mortar weaponry. His group developed the 82mm mortar in 1937. It had a more efficient design than its predecessor. This mortar passed all of its tests with honor during the Great Patriotic War.

It was followed into the Red Army's arsenal by the 50mm company mortar, the 107mm mountain-packed mortar and the 120mm regimental mortar. They operated without breakdown and could be successfully employed under any conditions, and what is particularly important, in broken and other difficult terrain. The extremely steep trajectory of the shells made it possible to destroy concealed targets and to fire from shelters and deep gullies. Mortar rivaled artillery guns of corresponding caliber with respect to fire power and were considerably lighter than the latter. The 120mm mortar, which weighed 288 kilograms, was in fact nine times lighter than the 122mm howitzer and 23 times lighter than the 122mm gun.

The mortar differed from other guns in the simplicity of its design. The modern artillery piece--the howitzer, for example,--is a fairly complex system made up of numerous mechanisms and devices. Its breech mechanism alone has more than 100 parts, and there are more than 1,000 in all. Modern muzzle-loading mortars consist of four parts: a barrel with a breech piece and safety element to prevent double loading, a bipod mounting, a base plate and a sight. Each part is of fairly simple design. The barrel imparts the required direction and initial velocity to the shell. It consists of a tube, smooth inside and out, with a breech piece screwed onto the end. Since the pressure of the powder gases in the barrel during firing is one third that of a gun, the tube is thin-walled. This significantly reduces the mortar's weight.

The striker, ordinarily a rigid one, is mounted on the bottom of the breech piece. The shell's detonator is pierced by it when lowered into the barrel. This provides for a rapid rate of fire. The breech piece ends in a ball joint by means of which the barrel rests on the base plate. The ball joint has an



B



Mortars

- Key:
- 1. Bipod mounting
  - 2. Yoke
  - 3. Double-loading
  - 4. Sight
  - 5. Shock absorber
  - 6. Barrel
  - 7. Base cap
  - 8. Copper obturating ring
  - 9. Base plate
  - 10. Striker stud
  - 11. Angle gauge
  - 12. Mechanical sight (vizir)
  - 13. Sight (vizir)
  - 14. Sight body
  - 15. Elevation mechanism
  - 16. primary cartridge
- A. Muzzle-loading  
B. Breech-loading

opening beneath the ratchet bar by means of which the breech piece is screwed onto or off of the tube, and two faces. Because of them the joint fits freely into a recess in the base plate and is securely attached to it by turning the barrel.

To prevent powder gases from the burning charge from escaping through the rifling in the breech piece when the mortar is fired, a copper ring is inserted into it. When the breech piece is screwed on, a steel tube presses into it, and this provides the needed seal.

A striking mechanism with two settings--rigid or cocked--can be installed instead of a rigid striker on the 107mm mortars. In the second position, the striker stud is always flush, and when a shell is dropped into the barrel its detonator is not smashed and there is no shot. This kind of striker makes it possible to adjust the laying after the mortar has been loaded.

The bipod mounting is of a somewhat more complex design than the barrel. Its purpose is to give the barrel its vertical and horizontal laying angles. The bipod is connected to the barrel by a shock absorber with a ring and clamps. The elevating, turning and balancing mechanisms and the sight are located on it. All of the mechanisms on the bipod are of the screw type. The elevating gear makes it possible to raise or lower part of the barrel, thereby changing the range of the shells. With the turning mechanism the mortar can be turned 3-4 degrees, depending upon the system. The balancing mechanism helps to keep the sight base horizontal. The shock absorber lessens the jolts occurring during firing and prevents the bipod mechanisms from being damaged.

The bipod itself, as the name indicates, consists of two legs (thin tubes) connected to the facing of the elevating device by means of an articulated joint. Footplates are welded to the bottom of each. A rough leveling mechanism is erected on the right one. It makes it possible to place the yoke into approximately horizontal position. This mechanism includes a clamping bush and a leg stay by means of which the bush is connected to the lifting gear casing. Precision leveling is accomplished by means of a moving sight mount on the yoke. The yoke itself is part of the bipod. It is used for securing the hoisting and turning mechanisms, the shock absorber and the moving mount and sight. The yoke has the necessary holes, lugs and slots for this purpose.

The base plate serves as a support for the barrel when the mortar is fired. It distributes the pressure over a relatively large surface, giving the mortar stability. It is a round metal plate. It has stiffening ribs welded to the bottom, which simultaneously serve as spades for support in the ground.

The mortar has a sight for precision aiming at the target. For laying the mortar it is first set up pointing at or in the basic direction of the target (horizontal laying), after which the chase is raised or lowered--that is, the barrel is set at an angle of elevation which ensures that the shell will fly the required distance (vertical laying). Horizontal laying is accomplished by means of an angle gauge and a turning gear. If a large angle of turn is necessary, the bipod mounting is first turned. The sight and a hoisting gear are used for the vertical laying. The horizontal angles are determined from the angle scale. A collimator is mounted on the upper part of the sight. This is a tube with a narrow vertical slit, which is aligned with the aiming point, or an optical viewer.

Muzzle-loading mortars are ordinarily hauled on motor vehicles or armored personnel carriers or are towed behind a tractor. If necessary the crew of the

82mm mortar can break it down into three parts--the barrel, the bipod mounting and the plate--and carry it in packs. The loading trays and mortar are carried in special packs.

For mountain transportation mountain-packed mortars are broken down into the large parts and hauled in horse-packs.

In 1943 the Red Army received the 160mm mortar created under the supervision of well-known scientist I.G. Leverovskiy. This mortar is of simple design, is light and easy to service. It can fire 40.5 kilogram shells 5,000 meters. The forces subsequently began to receive even more powerful, 240mm, mortars.

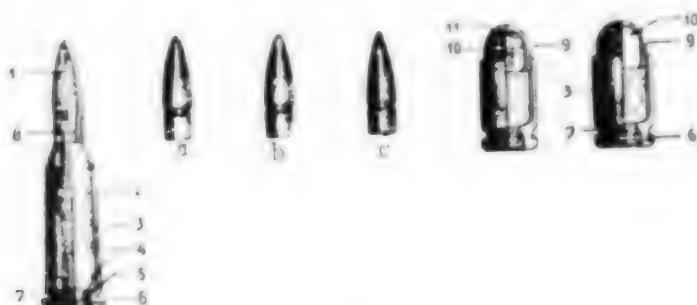
The large-caliber mortars basically retain all of the main design elements: a thin-walled barrel, a wheeled mounting, a base plate and a sight. Their operating principles are more complex, however. They are loaded from the breech end. The long barrel and heavy shell prevent them from being loaded from the muzzle.

Despite the rapid development of nuclear missiles, mortars are still important today, and their combat possibilities are far from exhausted. Foreign specialists point out such valuable features of mortars as their simplicity of design, their constant readiness to open fire, their reliability and their low cost. In the development of modern models attempts are being made to use new materials for making them lighter, more durable and maneuverable. Attempts are being made to give them greater maneuverability by mounting them on armored vehicles from which they can be fired. A great deal is being done to increase their firing range. Rocket-assisted shells are being developed abroad, which combine the features of conventional shells and missiles. Weapons are being designed which combine the features of mortars and howitzers.

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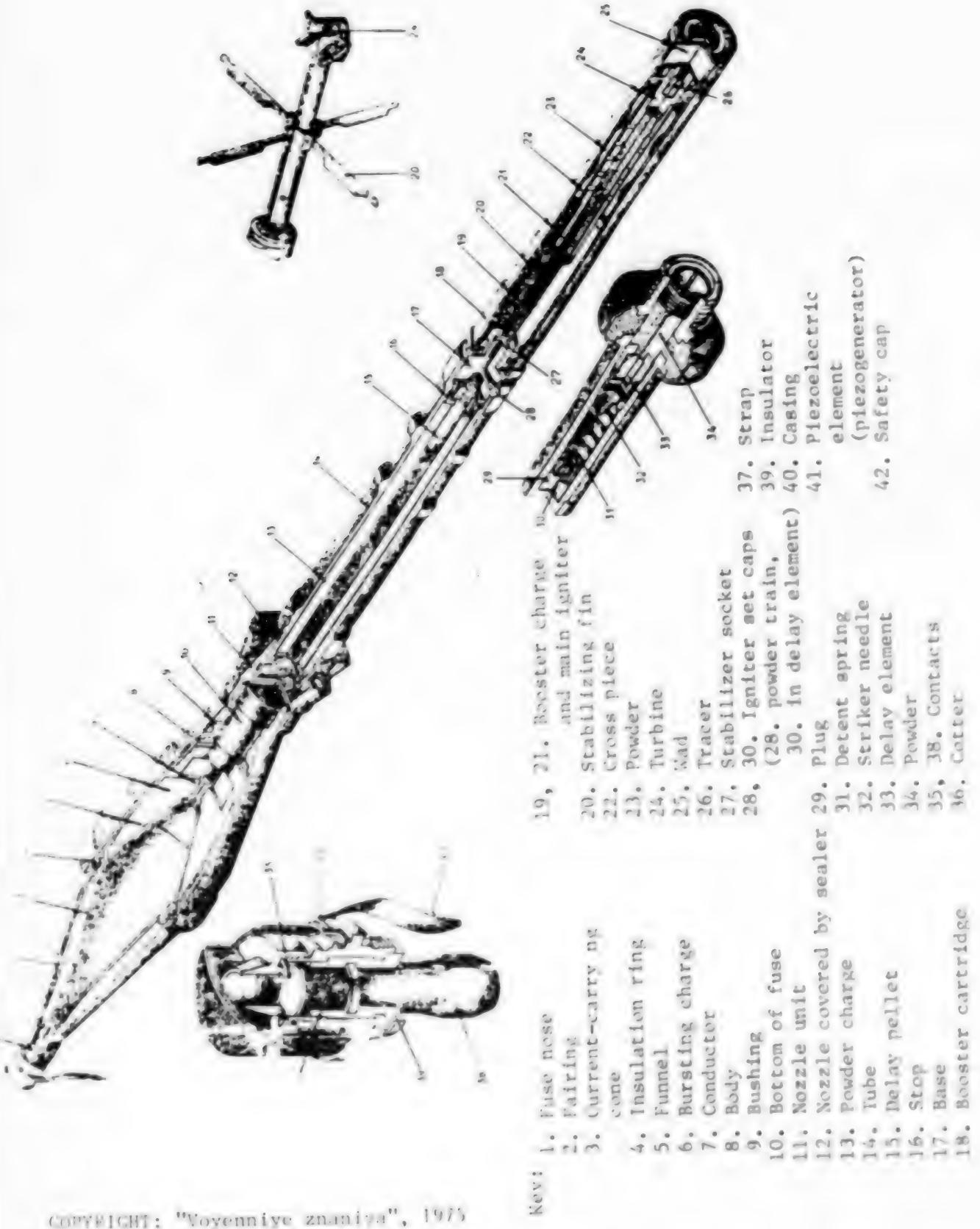
PG-7V Round

Moscow VOYENNYE ZNAMIYA in Russia No 3, Mar 75 back cover



1943 Model Round and 9mm Pistol Cartridge

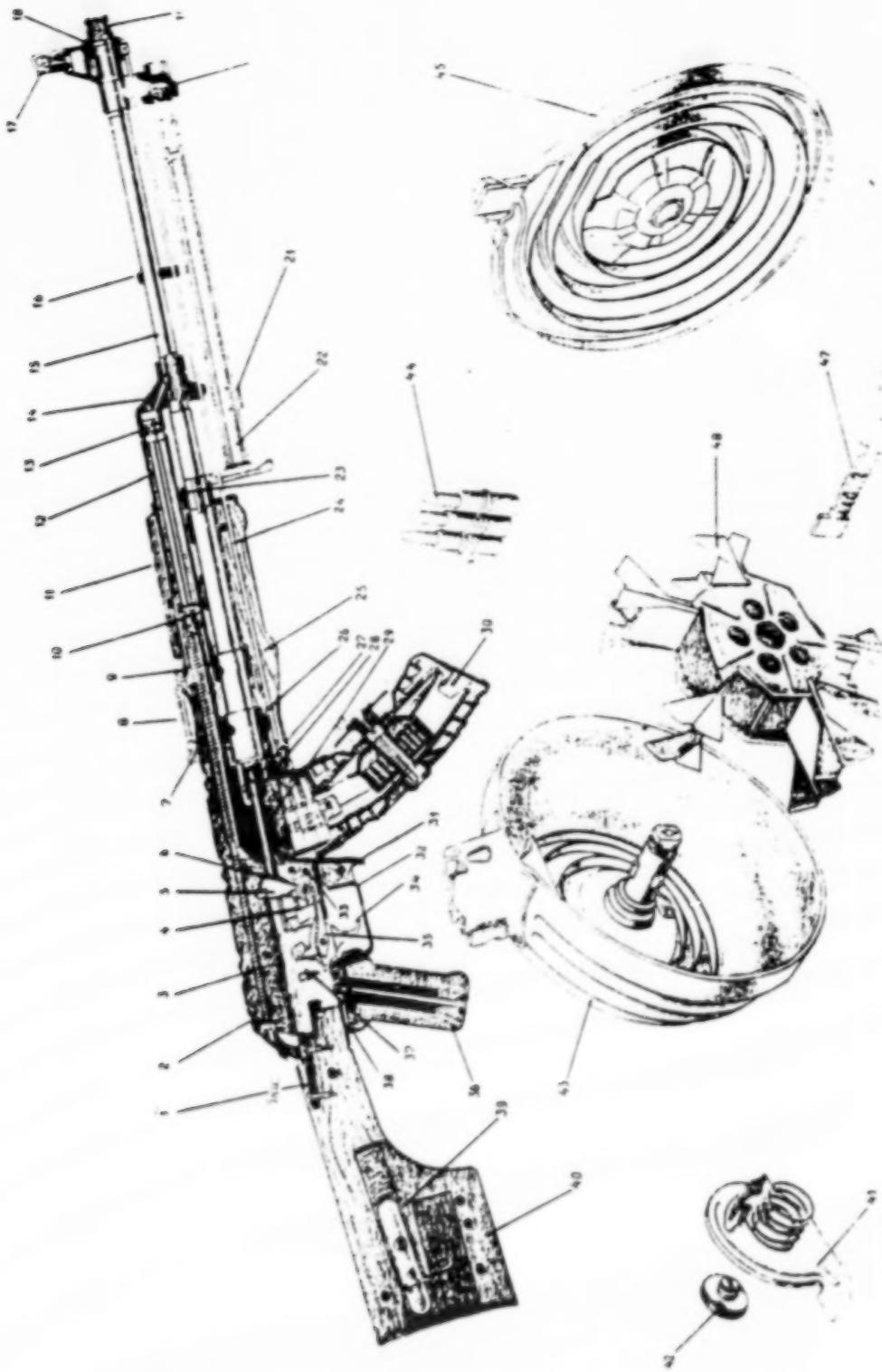
- Key:
- 1. Bullet (a. ordinary with steel core; b. tracer; c. armor-piercing incendiary)
  - 2. Powder charge
  - 3. Cartridge case
  - 4. Steel core
  - 5. Anvil
  - 6. Percussion cap
  - 7. Groove
  - 8. Cartridge case mouth
  - 9. Jacket
  - 10. Lead sleeve
  - 11. Steel core



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Kalashnikov Machine-Gun

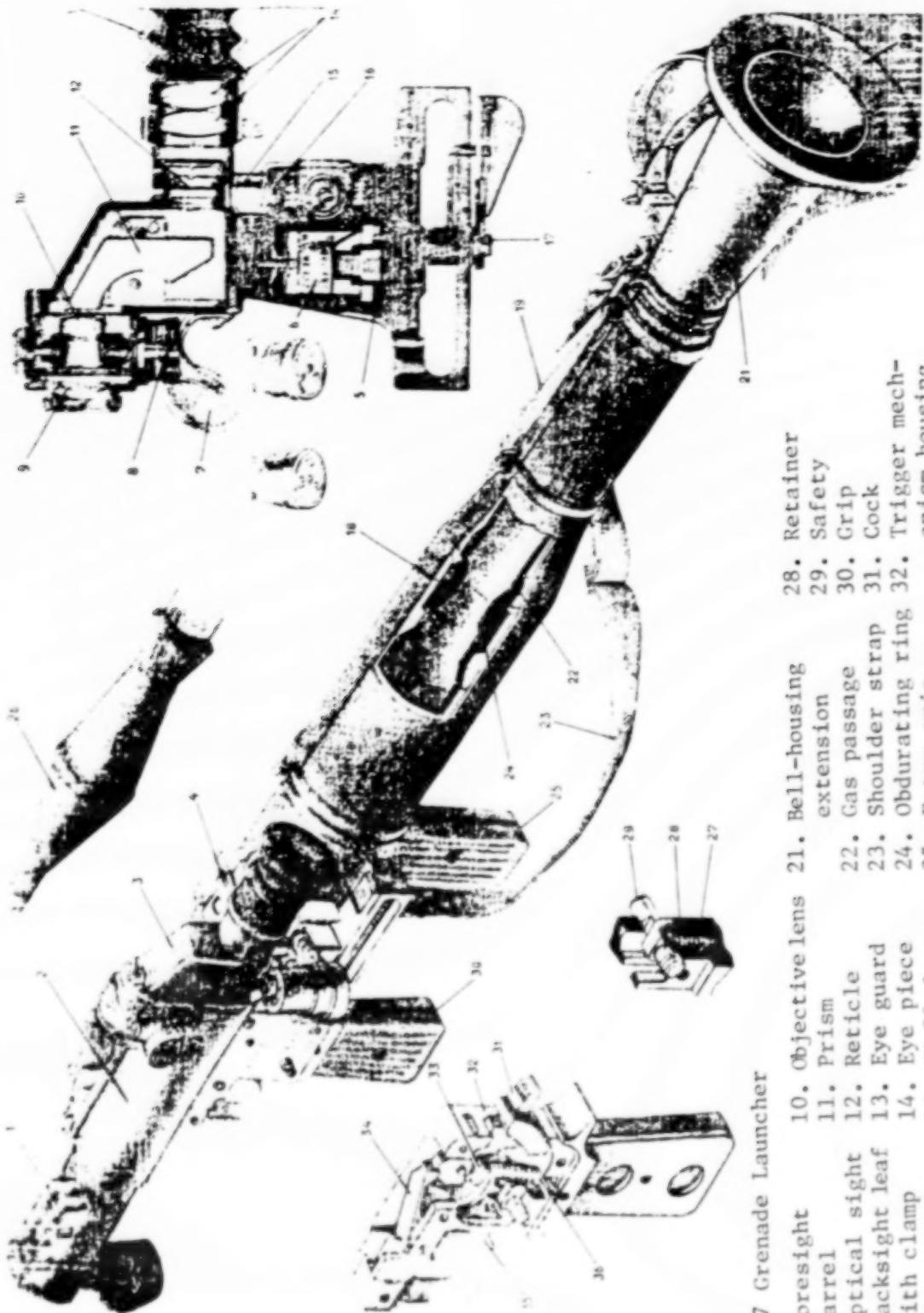
Moscow VOYENNYYE ZNANIYA in Russian No 11, Nov 74 back cover



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RPG-7 Grenade Launcher

Moscow VOYENNNYE ZNANIYA in Russian No 2, Feb 75 back cover



RPG-7 Grenade Launcher

1. Foresight
2. Barrel
3. Optical sight
4. Backsight leaf
5. Reticle
6. Electrical unit
7. Cap
8. Sight adjustment
9. Protective glass
10. Objective lens
11. Prism
12. Reticle
13. Eye guard
14. Eye piece with clamp
15. SR-36 electrical unit
16. Tightening screw
17. Gas passage nozzle
18. Feed guide
19. Bell-housing extension
20. Trigger mechanism housing
21. Objective lens
22. Gas passage
23. Shoulder strap
24. Obdurator ring
25. Extra grip
26. Grenade (arrows indicate alignment of grenade with barrel)
27. Retainer spring
28. Retainer
29. Safety
30. Grip
31. Cock
32. Trigger mechanism
33. Rod
34. Sear
35. Trigger catch
36. Striker spring
37. Notch for loading

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